WEST AFRICA.

Report

ON

CERTAIN OUTBREAKS OF YELLOW FEVER

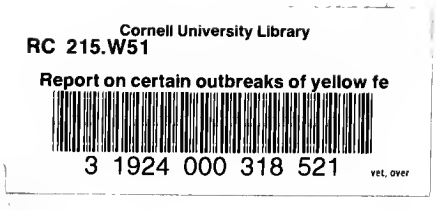
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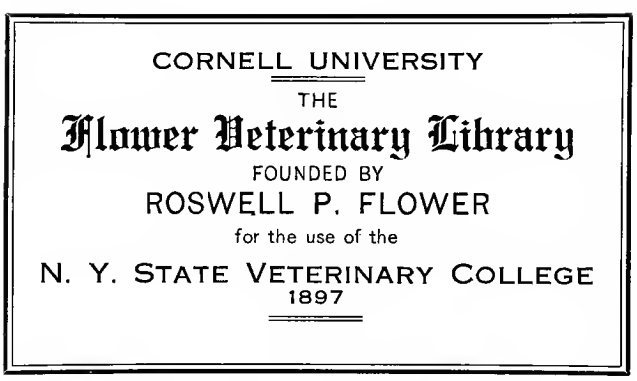
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INTRODUCTION.

This report was commenced by Dr. Horn while attached to the Colonial Office, and is based on the various reports from the Colonial Governments that have been received from time to time. Readers of the report will form their own conclusions as to the correctness of the diagnosis of the cases reported as Yellow Fever.

In order to secure a certain degree of uniformity the reports of individual cases have been edited to some extent.

A synopsis and a tabular statement of the cases have been added.

The material for this report has been supplied by various Officers of the Medical and Sanitary and other Departments of the Colonies concerned. These labours have been supplemented at home by the researches of Mr. G. A. K. Marshall, Scientific Secretary to the Entomological Research Committee; M. Roubard, Chef de l'Institut Pasteur; and Dr. Harald Seidelin, Scientific Secretary to the Yellow Fever Bureau. These gentlemen have very kindly checked and made additions to the information to be found embodied in the maps of West Africa. The London School of Tropical Medicine have also put at the disposal of the Colonial Office their Laboratory reports on specimens sent to them. The Medical Staff of the War Office have allowed access to the clinical reports on Case 12, and the General Staff have made themselves responsible for the printing of Maps 5 and 6.

Sir Rubert Boyce's report [Cd. 5581] should be studied for further information on the question of Yellow Fever in West Africa.

T. F. G. M.

March 17, 1913.

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Report

ON

CERTAIN OUTBREAKS OF YELLOW FEVER

IN

1910 AND 1911.

SIERRA LEONE, 1910.

Freetown.

On May 15th a case of Yellow Fever* was reported as occurring in the Nursing Home at Freetown, the capital of Sierra Leone. The diagnosis, which was definite, was confirmed by a post-mortem examination, and the acting P.M.O., in reporting the case to the Governor, also notified him that cases which he regarded as suspicious of the disease had previously occurred amongst the Syrian population of the town.†

On the diagnosis being made, the house occupied by the deceased was repeatedly fumigated with sulphur, together with the outhouses. The room in the Nursing Home containing the mosquito cage which was occupied by the patient was also fumigated on two successive days. An examination of the deaths registered in Freetown shortly before the occurrence of this case showed that the following deaths had occurred amongst the Syrian community shortly before :—

April 17th. (Case 1.)—(Death in hospital.)
April 17th. (Case 2.)—(Described as sudden death at home.)
May 5th. (Case 3.)—(Kissy Street, death in hospital.)
May 10th. (Case 4.)—(Little East Street, death at home.)
May 7th. (Case 5.)—(Death in hospital.)
May 13th. (Case 7.)—(Little East Street, died in Kissy Street.)

Of these, the deaths which occurred in hospital are noted (Cases 1, 3 and 5), but the history of the other three cases is obscure, and it could not be ascertained with certainty whether all these Syrians resided in the same locality. It was, however, found that more than one death had taken place in the same house. No connexion could be traced between this outbreak and that at Seccondee.

Steps were at once instituted for the prevention of mosquito breeding and the destruction of larvæ in Freetown, &c., in accordance with the following report, dated June 14th, by Dr. Kennan, the Senior Sanitary Officer :—

I wrote to the Town Clerk for the information of His Worship the Mayor, on the 16th, asking that a meeting of the Sanitary Committee should be summoned "to consider the action necessary in view of the fact that yellow fever has appeared in Freetown." A meeting was held on the 18th, at which my recommendations were unanimously adopted. These were chiefly that an increase should be made in the staff of scavengers, &c. This report was subsequently adopted by the Council.

I called the attention of the Mayor to certain matters with which the Buildings Committee are concerned, and which affected the facility for drain inspection and cleaning. A meeting of the Building Committee was held and action followed. The places chiefly concerned were visited the following morning by the Mayor, the City Works Surveyor, and myself, the points being explained to the people by his Worship. Other action has been taken under the Freetown Improvement Ordinance, 1899, but as I have not been directly concerned in it I do not refer to it further here.

I attach printed matter which was printed, widely posted, and distributed with the utmost despatch over the whole town, on the railway, and in Peninsula villages. The pamphlet on "Prevention of Yellow Fever" was abstracted from the illustrated pamphlet sent out from the Colonial Office last year. I omitted portions to make it more suitable, as I thought, for Freetown conditions, under which there is no necessity for anyone to store water on his premises. I also omitted details regarding the Stegomyia mosquito, as I wished to bring all mosquitoes under the ban.

The Commissioner of Police co-operated and issued instructions to stations in the

* Case 6.
† Cases 1, 3 and 5.

Peninsula, and to headmen in the villages. He suggested and obtained for them power to employ limited labour to assist in scavenging work.

So far as I was able to ascertain, the infected area was confined to the part of the town in which the main body of the Syrian population live, and the suspicious cases which had occurred prior to Mr. T.'s* were amongst Syrians only. I met some of the chief Syrians, and explained matters to them, and made enquiry directed towards ascertaining from whence infection had come, and where it had first shown itself in Freetown amongst them; I ascertained sufficient to convince me that the enquiry would prove a complicated and difficult one, and that I had better devote my energies to the conditions existing, than continue to myself pursue an enquiry which would certainly take much time and attention, and might result in little or no useful result as far as present conditions were concerned.

I went carefully through the Death Registry Book back to November last, but without discovering much to assist me.

I specially selected Dr. Pearson (medical officer, Moyamba), for the work of representing me in the infected area, for reasons I need not go into here, and withdrew him to Freetown. On the evening of his arrival I explained to him the course I wished him to follow. In forty-eight hours he placed in my hands a census of the Syrians in Freetown, with some details concerning each, and a map showing their houses and shops in such a way that I could at any moment identify and trace them. The details are: Identification house number, person's name, time in Freetown, where from, any illness lately; where sleeps, and under head "Remarks," willingness to allow fumigation, relationship to other Freetown Syrians, &c., &c. He subsequently visited each daily, and detected several suffering from malaria (active) and with the co-operation of Dr. Burrows, Acting Senior Medical Officer, treated them freely and kept them under constant observation. Most unfortunately, Dr. Pearson became indisposed, and though he was himself most anxious to continue the work, I was obliged to forbid it, and put him on the sick list. The work was then continued by Dr. McConaghy who had just arrived from leave.

As regards house-to-house visitation, and compound visitation generally through the town, I do not think I need say more than that I endeavoured to make the machinery, devised and worked by my predecessors, work at increased pressure.

Those premises which are reported as unsatisfactory have a notice served on the owner or occupier with respect to the default.

The European nurses' bungalow at the hospital was vacated by them, and a house in the town was rented for them, the bungalow being converted into an isolation building with two mosquito-proof rooms, capable of accommodating four patients. The stock of mosquito curtains was augmented, partly to allow of loans to persons outside until they had time to provide nets for themselves, and several were so lent.

All premises from which cases or suspects were removed were immediately fumigated thoroughly, and where business was done in a different place to that in which the person lived, both were fumigated with equal thoroughness. All premises known to have been occupied by the suspicious cases prior to that of Mr. T.* were also fumigated. Mr. T.'s* house was fumigated several times.

The Cape sanitary station, first devised for sea-borne plague suspects and cases, was not complete for yellow fever. Mosquito proofing of the hospital and bed cages was immediately commenced, as well as the provision of equipment which had never been supplied owing to plague having disappeared on the Gold Coast before the buildings were complete; they are now furnished.

Inasmuch as the river is rough and tornadoes are frequent at the commencement of the "rains," the transport of sick from ships to the station would expose them to hardship and risk if effected in an open lighter. One has been half covered to my design by the Coaling Company, and is now ready for use, and it is thought that it may also be useful for the transfer of convalescent town cases which it is desired to send to the Cape to recruit.

The attention of the Public Works Department was frequently called to the condition of drains, culverts, &c., which seemed to me to most urgently need repairs, as it has been my custom to do.

There are at present six masonry refuse destructors (incinerators) in full work in the town, as well as one at the railway settlement at Clinetown, built and used by the Railway Department. A large canoe is engaged daily in the removal of unburnable rubbish such as bottles, tins, &c., by carrying it out into the river. A second canoe has been ordered for the same purpose. The scavenging gang has been increased (for this time of year). The inspectors number 9, with a Chief Inspector, and each has a division of the town, as has been the arrangement for years.

Extra supplies of sulphur were cabled for from England, also mosquito bobinette, &c.

I wired to the medical officers at Bo, Daru (Moa River Barracks of the West Africa Frontier Force) and Bonthe regarding mosquito protection of public and private water storage, and have received replies on which action is being taken as appears necessary.

I have been struck by the ready way in which the public has responded to requests that they should show greater diligence in removing refuse of all kinds from their compounds,

* Case 6.

and by the support afforded by the Syrian community as a body. More particularly is this remarkable as I can discover no evidence of panic or excitement in any section of the Freetown public.

I may add lastly that the "Clayton" machine is in working order, in a special house built for it with two chambers and a storeroom, under the same roof on the wharf.

The Syrians in Freetown number 72, and occupy part of, or all of, 55 premises. I have kept in touch with the Senior Medical Officer, R.A.M.C., Colonel Sutton, from the commencement.

In the Harbour the labourers engaged in working the ships were medically examined and their temperature observed; all tugs and lighters were kept clean and used only during daylight; ships were moved 1,000 yards from the shore, and no deck passengers were carried from Freetown. Restrictions were also imposed on canoe traffic.*

On May 25th the death of another Syrian from Yellow Fever occurred. (Case 8.) He was reported to have arrived from Dakar (near Cape Verde) three weeks before his admission to the Colonial Hospital on May 23rd. Later in May and early in June two further cases occurred amongst Europeans. (Cases 9 and 10.)

Sir Rubert Boyce, who had sailed from England on June 1st with additional medical officers to render assistance in the Gold Coast and Sierra Leone, arrived at Freetown on his outward journey to Seccondee about June 13th, a few days after the death of a European (Case 11) from Yellow Fever. After consultation with the Senior Sanitary Officer, he decided to continue his journey to Seccondee, leaving behind him two of the medical officers to assist in carrying out the preventive measures. Quarantine was raised from Freetown at the end of June, all necessary anti-mosquito measures being continued.

On July 18th, another death (Case 12) occurring from Yellow Fever, Freetown was again declared infected, the Harbour Regulations of May being again put into force. Cases 13–18 occurred subsequently.

Sir Rubert Boyce visited Sierra Leone early in August, and investigated the facts connected with the outbreak in Freetown. He also visited Kennema, the head-quarters of the railway district, and Bo, on the Sierra Leone Railway. Before leaving the Colony he issued a preliminary report, of which an extract is reproduced. (Appendix B.)

On August 20th, eighteen days after the last death from Yellow Fever and the screening of the last suspected case, the regulations were rescinded and the port declared free, but on the fatal occurrence of another case on August 30th (Case 19), infection of the town was again declared.

In September a Public Health Amendment Ordinance was enacted to deal with mosquito-breeding facilities in water in Freetown, and the following report of action taken in connection with the visit of Sir Rubert Boyce was made by Dr. Kennan (September 8th).

Sir Rubert Boyce's visit came at a most opportune moment, and one of great psychological importance in connection with the Yellow Fever outbreak in Freetown. Local effort by local persons, no matter how conscientiously directed, is liable to deteriorate in the presence of tacit resistance and quiet indifference. The public tire of the same tune played by the same players, who find it hard to introduce fresh variations. Sir R. Boyce held conferences with the medical men of Freetown. All the private practitioners, officers of the Royal Army Medical Corps and Colonial medical service were present, and their interest was stimulated. He also met the principal European and native merchants in conference, and lectured twice in public.

His presence and influence was also made apparent in many parts of the city during his house-to-house visitations, and the supreme importance attached by such an expert to what had appeared to many as of small account constituted a series of object lessons.

But the number that can be reached by these means still leave many only indirectly influenced. A meeting was held in Government House subsequent to Sir R. Boyce's departure of most of those interested in education, and the position was explained to them and their co-operation invited. As a result, a number of persons of education and standing amongst the natives, mostly recommended by those who attended the meeting, volunteered to give

* Appendix A. These regulations were made on May 30th, and no doubt came into force on that date.

instruction to the public by going from house to house, taking with them notices and literature, and each carrying a notebook in which observations were made on any points coming to their notice, and especially those to which my attention should be called.

As the town had been further divided into 14 sections, and the staff of inspectors increased to that number, 14 male and 14 female "superintendents" were employed, and their work apportioned amongst them.

Their work was essentially different from that of the inspectors, and this was carefully explained to them. While they inspected they taught and reasoned in a way it is impossible for inspectors with their other many duties to perform—supervising labourers, issuing notices, oiling wells, pools, &c.—while the status of the "superintendents" carried weight on account of their superior social and educational standing rather than as representatives of the law, as inspectors are, and on which they have to chiefly rely.

On the whole the superintendents have been well received, and evidence has been forthcoming that they have not been lacking in persistence or initiative. The "tone" of the anti-Stegomyia work has been raised through their work to a point from which I do not think it will recede, and has received an impetus which will help to carry it far till habit has had time to develop amongst the people of regarding mosquito larvæ as objectionable, and things to be got rid of.

The number of labourers was increased to 200, but still the amount of refuse removed from compounds by occupiers was so great that it could not be effectually dealt with by the scavengers with sufficient rapidity, and the mule and oxen so frequently get sick, if hard worked, that six refuse hammocks were made to a pattern suggested by His Excellency, and have been of considerable assistance in rubbish removal ; four men with a hammock now remove as much as it took eight men to remove with head loads before, and in as short a time.

Another canoe has recently been built, and is now employed in carrying bottles, tins, &c., out to sea; the condition of the foreshore having made it imperative that simple "dumping" there should not continue.

Another incinerator has been completed, and is working.

The Mayor and Corporation have declared Wednesday in each week to be a special "cleaning up day" for inhabitants, and the city clergy, schools, &c., are being asked to assist in making this known, and in frequently reminding the public of their duty for that day.

One of the difficulties of the anti-Stegomyia campaign is the uncovered barrels; it is one thing to have a cover and another to have it kept in place. Sir R. Boyce was shown various designs, and those were demonstrated to the educationalists at the meeting at Government House. Two sample barrels fitted to make them mosquito-proof have been placed in prominent places in the town, and a number of barrels belonging to poor and aged persons have been fitted free of charge, partly for the benefit of the owners and partly as specimens in various parts of the town where other more favoured persons can see them, and take as models.

The provision of broken stone for filling pools and hollows in the west part of the town, suggested by Professor Simpson during his visit, and which has been done from time to time since, has been pushed with vigour, and the heaps are removed and used by the people with a rapidity which indicates how greatly they appreciate this work. During the rains the benefit is naturally more appreciated by the public, and its necessity is more evident.

At the instance of Dr. Kennan the following notice was published :—

DECLARATION.

"*Cleaning Up Day.*"

It is from want of thought more than from want of energy or effort that so many old useless tins, bottles, pans, calabashes, and other things are not removed to the refuse bins by occupiers from their premises, yards, and compounds.

In order that persons may be frequently reminded of their duty in this respect the Mayor and councillors of this city hereby declare and proclaim the day of Wednesday in each week to be special

'Cleaning up Day,'

and enjoin all inhabitants to pay special attention on that day to ensure that all useless old vessels are removed to the refuse bins, and none allowed to remain on their premises.

It is not intended that this duty should be neglected on other days, but it is hoped that when a special reminder day is observed every week, it will assist the public in preventing accumulations in their compounds, yards, and premises, by frequently reminding them of the duty of removal.

J. H. THOMAS,
Mayor.

On the 19th of September it was decided that, eighteen days having elapsed since the last death from Yellow Fever, ships calling at Freetown should be given a clean bill of health, but that the regulations previously instituted for the protection of shipping should continue to be enforced for a time. The wisdom of the latter decision was proved by the occurrence of another fatal case of Yellow Fever in the town on September 22nd (Case 20). This was the last known case to occur.

In connection with the possibility of Yellow Fever existing in natives of West Africa in a hitherto unrecognised form, the report by Dr. R. H. Kennan, Senior Sanitary Officer, Sierra Leone, with comments by Dr. J. W. Collett, Senior Medical Officer, Sierra Leone (lately Medical Officer, Southern Nigeria), is of interest.*

GOLD COAST, 1910.

Seccondee.

This account of Yellow Fever on the Gold Coast in 1910 is based largely on the report of Dr. Rice, Senior Sanitary Officer, Gold Coast.

On the 12th of May the Acting Principal Medical Officer received a letter from Dr. Ralph, the Medical Officer in charge of Seccondee, reporting the occurrence of three cases which exhibited the clinical symptoms of Yellow Fever, the first case having occurred on the 12th of April (Case 23).

On the 13th of May Dr. Ralph sent a telegram reporting the admission to hospital of two fresh cases (Cases 25 and 26) presenting suspicious symptoms.

After consulting the Senior Sanitary Officer, the Acting Principal Medical Officer communicated with the Colonial Secretary, informing him that they were of opinion that Yellow Fever existed in Seccondee and advising that the port should be declared infected.

The same day the port of Seccondee was declared to be infected.

Accompanied by the Assistant Commissioner of Police, Mr. A. H. Hammond, the Senior Sanitary Officer proceeded to Seccondee on the morning of the 14th of May. They arrived there the same evening, taking with them the small Clayton machine and a supply of sulphur.

Seccondee being the port of entry to the interior and the base of the railway, considerable inconvenience would have been caused to persons desiring to proceed to and from the interior had it not been decided to require steamers to call at the neighbouring port of Chamah—11 miles east—in order to embark and disembark passengers there. The distance from Chamah to the nearest station on the railway, Ashieme, is only 9 miles.

The Transport Officer, Mr. F. W. H. Migeod, was placed in charge of Chamah and deputed to organise the transport.

He left for Chamah, accompanied by Dr. Slack, early on the 15th of May.

On the morning of the 15th of May a public meeting was held in the District Commissioner's Court, at which the nature of the outbreak and the preventive measures contemplated were explained to those present.

The Acting Provincial Commissioner presided; Dr. Rice explained the nature of the infection which had broken out in the town, pointing out that it would consequently be placed in quarantine for a period. He stated that Commercial Town—the portion of the town bounded on the west by the Hospital Road, on the south by the sea, and on the north by the Railway Timber Siding—had been declared an infected area, and that an order for the evacuation of that part of the town by Europeans at night time had been made by the Governor. He asked for assistance in the formation and charge of "mosquito brigades" and that a supply of Alformant disinfecting lamps be at once obtained, while all stores of kerosene should be kept in reserve.

* Appendix C.

Temporary segregation areas would be provided for Europeans living in the infected area and arrangements would be made for the mail steamers to land passengers at Chamah, where a transport system had been organised to Ashieme and other stations on the railway; only goods and cargo would be landed at Seccondee and railway passenger traffic would be temporarily suspended. The immediate precautions he should adopt to exterminate mosquitoes were :—

To make holes in every yard of guttering in houses and buildings.
To render every tank mosquito-proof.
To treat every water receptacle with kerosene.
To close all wells and to clean up compounds.

The Europeans residing in the infected "Business Area" * were informed that the Evacuation Order would be put in force at 5 p.m. on the 17th of May, and from that hour Europeans would only be allowed within the infected area between the hours of 7 a.m. and 5 p.m.

The same evening arrangements were considered for the draining of No. 1 Lagoon, which was started the following morning by the assistant engineer of the harbour works at Seccondee.

On the 16th of May mosquito brigades were organised under European supervision.

By the afternoon of the 17th of May the Public Works Department, by working night and day, had erected temporary buildings on K. Hill for the accommodation of Europeans turned out of Business Area at night by the Evacuation Order. Some of the merchants had also erected temporary buildings on the same hill.

Sleeping accommodation was also provided at the Club, at the European Hospital. and at the Hotel Metropole. The total number of Europeans residing in Business Area amounted to 49, and of these 47 were provided with accommodation by 5 o'clock on the evening of the 17th of May, a few living in tents on the Recreation Ground. Two Europeans only were allowed to remain in Business Area at night—one at the Bank and one at the Cable Company, one room and a portion of a verandah having in each case been made mosquito-proof and the occupiers having promised not to leave the mosquito-proofed rooms between the hours of 5 p.m. and 7 a.m.

A post-mortem dissection made on a Hausa (Case 28) on the 14th of May had shewn the tissue changes characteristic of Yellow Fever and an autopsy held on a Kroo boy (Case 29) on the 16th of May revealed the same changes. One hundred and three contacts with the Kroo boy were secured and isolated in tents on a site selected to the north of K. Hill. As the occurrence of these cases pointed to the disease being possibly widespread among the natives of Seccondee, though only occasionally, probably, giving rise to grave symptoms or terminating in death, it was decided not to allow any natives to leave Seccondee, and to place a police cordon round the town. This was placed about 6 miles out so as not to interfere with the market women and children bringing food supplies into the town from their farms. All passenger traffic by train out of Seccondee had already been stopped.

A third death subsequently occurred from the same cause, the victim being a native woman (Case 34).

For the first few days the efforts at fumigation were somewhat handicapped owing to the small Clayton machine having been damaged in transit. The bungalows were sealed up and fumigated by burning sulphur, using 2 lbs. for every 1,000 cubic feet of space. Literature on the subject was sent out to the public, and sulphur was issued free to all literate persons residing in the infected area.

Later, when the small Clayton was working as well as the large machine, which arrived subsequently, every house in Business Area was fumigated

* On the 14th of May there were 153 Europeans in Seccondee; of these 49 resided in "Business Area."

once, as well as all the European bungalows outside the infected area; in many instances this was done three or more times.

In all 164 separate buildings were fumigated, and when Sir Rubert Boyce and his assistants arrived on the 15th of June the assistants were all set to work to fumigate these buildings again, so that every house was done under efficient medical supervision.

The parcels and mail bags were sterilised by the railway authorities with dry steam under pressure.

All the closed wagons on the railway were fumigated with sulphur before being loaded; the open trucks and passenger carriages were freely sprinkled with kerosene and brushed out by a gang of sweepers shortly before the departure of each train.

The lighters and boats going off to the steamers were white-washed and sprinkled frequently with kerosene, but as the anchorage at Seccondee is two miles off the shore, there is little danger of any mosquitoes being conveyed from the shore to the ships.

The preventive measures adopted may be briefly summarised as follows :—

(1) The evacuation of every infected bungalow. These bungalows were sealed up, and each of them was fumigated with sulphur and afterwards Claytonised.

(2) The evacuation of the infected area, by Europeans, between the hours of 5 p.m. and 7 a.m. This continued for a month, and no European was infected after the Evacuation Order was put in force on the evening of the 17th of May.

(3) The fumigation with sulphur gas of every house in Business Area and of every European bungalow outside it.

(4) The perforation of all gutters, a hole being punched in each linear yard of guttering.

(5) Gangs were sent round collecting all tins, bottles, or other receptacles liable to breed mosquitoes.

(6) The whole town was divided up into mosquito-brigade areas, each of which was in charge of a European, who went round with a small gang. At first the people were warned and the larval breeding vessel was merely oiled or upset, but afterwards full advantage was taken of the special anti-larval powers—the power to destroy—passed in Council on the 17th of May, and any vessel found to contain larvæ, when no honest attempt had been made to screen it, was destroyed. Barrels were emptied, turned over, and their ends staved in with an axe.

(7) At an early period of the outbreak—May the 21st—83 non-commissioned officers and men of the Pioneer Company of the Gold Coast Regiment were sent to Seccondee, and they proved to be invaluable. A number of them were engaged in fumigation work, and became very efficient; the others were divided up among the gangs of men engaged in clearing bush in and around the town, and thus it was possible to keep constant supervision over the large additional gangs of labourers employed, numbering from 90 to 150 men each day.

(8) Not the least of the preventive measures taken was the draining of No. 1 Lagoon. The Medical Officer of Health, Dr. Slack, had reported that this lagoon bred innumerable Stegomyia. The lagoon was over four acres in extent, and hence it was important to get rid of this large breeding area. Mr. Beard, the Assistant Engineer of the Harbour Works, started this work on the 16th of May, and on the evening of the 17th nothing but a few puddles remained of this lagoon. A wooden sluice was subsequently put in, and the lagoon emptied at low tide each day, the few puddles that remained being treated with kerosene.

Public notices to all natives in Seccondee were issued on May 20th by the Senior Sanitary Officer, saying that any who wished to leave Seccondee should apply to the Provincial Commissioner for permission to reside in the Native Segregation Camp (beyond No. 2 Lagoon) for five days isolation, after which they would be allowed to leave Seccondee under medical certificate. The camp was ready for occupation on May 23rd.

Notices were also issued to all ministers of religion and teachers in schools at Seccondee explaining the nature of the infection and urging them to use their influence in furthering the destruction of mosquitoes and their larvæ. Rules for the prevention of the spread of the disease and for mosquito and larvæ destruction were made public.

Following the outbreak of Yellow Fever at Seccondee, Seccondee was declared an infected port by the Governor on the 13th of May and evacuation of the Business Area between the hours of 5 p.m. and 7 a.m. was ordered. On the 17th of May quarantine regulations were applied to the port and regulations under the Infectious Diseases Ordinance of the Colony were made empowering the Senior Sanitary Officer to take steps to prevent the spread of the disease and deal with the destruction of mosquitoes.

Arrangements were made by the Secretary of State for the Colonies with Elder Dempster & Co. to land and embark passengers at Chamah, the assurance being given them that their steamers would not be treated as infected or suspected ships or exposed to special restrictions at other British ports in West Africa in consequence of their calling at Seccondee for mails and passengers only. Foreign steamers refused to call.

The quarantine of Seccondee was raised on June 15th, 25 days after the isolation of the last case and 19 days after the last death from Yellow Fever.

It will be convenient here, the cases among the natives having been already alluded to, briefly to describe the course of the outbreak.

In view of the subsequent events, it appears to be possible that the first case that occurred was case 22. The patient arrived in Seccondee on the 10th of March, slept in the Town Council Offices, was taken ill on the 19th of March, and died on the 24th of March. This case, however, was at the time considered to be one of Typhoid Fever. The Town Council Offices, it must be remembered, adjoin Mr. Cosby's bungalow, to which four cases were subsequently traced (namely, Cases 24, 25 and 31).

The second case occurred on the 12th of April (Case 23). The patient was living in Cosby's bungalow.

The third case (Case 24) occurred on the 27th of April. This patient also was living at Cosby's bungalow.

Case 25.—On the 8th of May. This patient was frequently in Cosby's bungalow, where he went to see a colleague of his who was living there.

Case 26.—On the 9th of May. This patient lived in the Wesleyan Mission bungalow, in Business Area.

Case 27.—On the 9th of May. This patient lived at Rust's bungalow.

Case 30.—On the 18th of May. This patient lived at Bissue's Hotel.

Case 31.—On the 19th of May. The patient lived in Cosby's bungalow.

Case 32.—On the 20th of May. This patient lived at the Wesleyan Mission bungalow.

Case 33.—On the 22nd of May. The patient, on the evening of the 17th of May, whilst in Business Area supervising the carrying out of the Evacuation Order, found the patient (Case 30) sick in Bissue's Hotel, and remained there for some time awaiting the arrival of a hammock to remove him. Here it was, in all probability, that this case was infected.

From the above description it will be seen that all the cases can be traced to four of the bungalows coloured red on the spot map attached.*

* Map 2.

The last case that occurred, therefore, was (Case 34) on the 24th of May, six days after the putting into force of the Evacuation Order.

Below are the periods which those attacked had spent in Seccondee :—

Case 22.—Nine days.
" 23.—Three months.
" 24.—Fifteen months.
" 25.—Three months.
" 26.—Two months.
" 27.—Twelve days.
" 30.—Some months.
" 31.—Seven months.
" 32.—Eleven days.
" 33.—Twelve days.

Axim.

On the 15th of July the death of an unofficial European (Case 36) occurred at Axim, in the Gold Coast Colony ; it was regarded by the Medical Officer as suspicious of Yellow Fever, and the Senior Sanitary Officer, when informed of the case, came to Axim, as he considered the case to be one of Yellow Fever. The bungalow in which the death took place was evacuated, sealed up, and fumigated, its inhabitants, European and native, being isolated, while the adjoining bungalows were also fumigated. A public meeting and a meeting of the Sanitary Committee of Axim were called, the town divided into twelve areas, in each of which a mosquito gang was placed to work under European supervision.

No further case occurred and Axim was not placed in quarantine.

Saw-Mills.

On the 18th of July an unofficial European (Case 35) was brought down to Seccondee from the "Saw-mill Camp," $12\frac{1}{2}$ miles up the railway from Seccondee. The camp was visited the following day by a medical officer and later by the Senior Medical Officer and the Senior Sanitary Officer. It was originally occupied by five Europeans living in two bungalows situated about 300 yards south of a native village occupied by their employees. The village contained 35 houses and 95 persons, and was very dirty. There were no sanitary arrangements, the place was overgrown with bush and littered with the accumulated bottles, tins, &c., of ten years, in which enormous numbers of mosquitoes were breeding. In one day alone 60 head-loads of tins and bottles were removed from this village.

The sanitary measures taken were :—

The evacuation, sealing, and fumigation of the bungalows occupied by Europeans.
Cleaning up round the bungalows.
Cleaning up the village.
Erection of a camp for the Europeans.
The building of a fly-proof hospital.
(The railway carriage in which the patient travelled to Seccondee was sealed and fumigated.)

No further case occurred.

SOUTHERN NIGERIA, 1910.

Lagos.

Two suspicious cases (Cases 37 and 38) occurred in Lagos in July and September, 1910. No epidemic occurred.

GOLD COAST, 1911.

Accra.

On February 19th, 1911, the death of a European (Case 40) occurred at Accra from Yellow Fever two days after admission to hospital. Swanzy's

factory at Accra was sealed at once, and fumigation of the building by means of a large Clayton machine performed the same day. A residence known as "Governor's Lodge," on the outskirts of Accra, was placed at the disposal of the Medical Department and two Europeans isolated there as contacts.

On February 6th Case 39 was taken ill of what was diagnosed as acute yellow atrophy of the liver. He died on February 24th.

The following measures were at once put into force :—

Inspection of Europeans in the district daily.

Post-mortem examination of all natives dying under suspicious circumstances.

Fumigation of all merchants' premises in the town.

Free issue of sulphur and Alformant lamps.

Organisation of a special gang to attend to mosquito destruction in the vicinity of infected premises.

The contacts were allowed to return after ten days' isolation, and fumigation was energetically continued in the native houses after the European residences had been completed.

No further case occurred, and the Gold Coast appeared free of the infection until May 17th (Case 40). On May 23rd (the same day on which Yellow Fever was also reported from the Gambia), a European attached to the Basel Mission factory was admitted to hospital and died the same day of Yellow Fever (Case 41). Another European, contact of the former case, was also diagnosed as suffering from Yellow Fever and admitted to hospital on the 23rd May, where he died on the 28th (Case 42).

The Basel Mission premises in the High Street were at once fumigated, and the Europeans and natives living in the premises were removed and segregated. Of the natives so isolated three developed Yellow Fever on May 27th. (Cases 43, 44, 45.)

Accra was declared to be an infected port on May 25th, and the preventive measures instituted by the Sanitary Department are described as follows by the Acting Senior Sanitary Officer, Dr. G. C. Walker :—

> "At 4.30 p.m. on May 23rd the Sanitary Authorities were notified by the Medical Department that two Europeans certified to be suffering from Yellow Fever had been admitted to the Government Hospital."

No further cases developed after the three which occurred amongst the natives isolated on May 26th, and Accra was declared free from infection on June 14th.

Ten days later, however, on June 22nd, another case occurred in a European at Accra (Case 46). On June 29th the death of a non-official European (Case 47) was reported at Avreboo, 9 miles inland from Axim. The following preventive steps were at once instituted at Accra on June 24th :—

The patient (Case 46) had been living in the Public Works barrack quarter. Seven other European officials were living there with twelve native servants.

These seven Europeans and their twelve boys were at once removed to Governor's Lodge and isolated there. They were medically examined daily.

By 5 p.m. the residents, European and native, had been removed out of the infected area, and the barrack quarters had been sealed up and fumigation of the living rooms was well under way.

Fumigation of all the buildings in the infected area was thoroughly effected.

A special Order in Council was obtained on the 24th June declaring the area an infected area.

By July every building in the area had been dealt with, the inhabitants allowed to return to their homes and the close cordon drawn round the infected area removed. The low and dense scrub was cut down and the roots dug up.

A special report on Accra in relation to Yellow Fever has been made by Dr. Walker, the Acting Senior Sanitary Officer. (Appendix F.)

Avreboo.

The following report on Avreboo, near Axim, is of interest.

Avreboo Rubber Estate is about 10 miles north of Axim. It is situate in a very hilly but sparsely populated country.

The section of the estate dealt with in this report covers an area of one square mile.

The Government Medical Officer reported on June 28th, 1911, that a fatal case of Yellow Fever had occurred in this district.

The village of Avreboo stands on a slight rise in the valley, and is situated near the centre of the cleared area. The village itself is surrounded by bush and trees. There are about 400 inhabitants.

The building in which the late Mr. S. (Case 49) lived was 50 yards from the village and at its south-westerly corner. It was also surrounded by trees and bush. The branches of the rubber tree swept the bungalow roof.

There was one other European, Mr. D., who occupied rooms in this bungalow.

There were no other Europeans in the district at the time of Mr. S.'s attack of Yellow Fever.

The village itself was occupied by natives of the district, and employees of the Rubber Company ; these latter consisting of Hausas, Wangaras, and Fanties.

The Company working the estate have no control over the village of Avreboo.

There is a Kroo-village, erected by the Company for their Kroo labour and containing about 200 souls, situate about a quarter of a mile away in a south-westerly direction.

This village stands in a portion of the cleared area, and is under the Company's control.

There is a plentiful supply of water and the natural drainage is good.

The late Mr. S. (Case 49) :—

Previous History :—Mr. S. had been employed on the Gold Coast for some years before this time, doing various works, and had always enjoyed good health. He had only been out a few months this tour. His last visit to Axim was made a month before his fatal illness. He took six Wangaras with him. None of these men have shown any signs of illness neither at that time nor at any time since.

Some boys were sent into Axim a week before he took ill. They went to Axim and returned on the same day. No case of illness has been found among these boys.

Kroo-boys were engaged at various times under contract and came direct from the Kroo Coast. One batch arrived on December 12th, 1910, and another batch arrived on January 28th, 1911.

Some odd boys were picked up from Axim on April 17th, 1911.

Twenty-four Wangaras arrived on June 22nd, 1911. In the evening of that day Mr. S. (Case 49) first complained of feeling ill.

This batch of Wangaras had come over from the Ivory Coast three months before, and had been working in Axim up to the date of their arrival at Avreboo (at the end of the three months).

During the whole of the period under review, and since, there has not been a case of illness reported or found amongst the employees.

This estate finds carriers and hammock men for all the Government officials in Axim. Consequently many of their men are constantly away, sometimes for a long period.

It was, therefore, not possible to see these men when inspecting the camp.

During the week before his death Mr. S. had been working with some of the labourers. He was constructing a road to the camp. Part of the work consisted of digging into the hillside, while a portion consisted of filling up sections of swamps which the road had to cross.

The whole district is infested with Stegomyia. During the inspection they were very tiresome, especially during the day. Only two *S. fasciata* were found during the three days' visit.

He always slept under a mosquito net.

Action taken.—The Medical Officer of Axim visited the camp. He arrived after Mr. S. had died. He directed that the body should be at once taken into Axim for a post-mortem examination. (Results already sent.)

He directed that the village should be fumigated and cleaned, the bungalow inhabited by the Europeans destroyed. This was done.

The natives were inspected, but no case of illness was found either then or later.

The European settlement was removed to the top of a hill about 600 yards to the west of the village, and the whole of this new site cleared of all trees and undergrowth. As soon as dry all the herbage and timber was burnt.

There is now one square mile of thoroughly cleared land, in the centre of which the new European settlement is situated.

There are now three Europeans there, and they are sleeping in tents and temporary shelters.

New bungalows are in course of erection.

Accra.

No further case of Yellow Fever was reported in the Gold Coast until December 20th, when a European death occurred at Accra (Case 48), but a suspicious case occurred there on August 26th (Case 47).

GAMBIA, 1911.

Bathurst.

On May 18th, 1911, Yellow Fever broke out in Bathurst, the capital of the Gambia, a Corporal and a Sapper in the Royal Engineers and a clerk in the Bathurst Trading Company being attacked (Cases 50, 51 and 52) and admitted to hospital on the following day. On May 20th two further European Cases (53 and 54) occurred, and the Governor was notified as to the nature of the disease on the 21st.

In reporting (on May 31st) on the outbreak, Dr. Hood, Senior Medical Officer of the Gambia, stated as follows :—

All the patients had been carefully screened from the moment they began to feel ill, and other occupants in the barracks and Bathurst Trading Company had been particularly warned to shield themselves, as it was evident there were infected mosquitoes about.

The quarters occupied by the Engineers and the room beneath were carefully closed to prevent all mosquitoes from escaping, with the view of destroying them later, and extra precautions were taken to prevent the two patients outside the hospital from being bitten. Mosquitoes in the neighbourhood of the latter were searched for and killed, and at other places.

Europeans living in the neighbourhood were examined twice daily for any suspicious symptoms.

Enquiries were made to trace the origin of the outbreak, and it is interesting to note that all five patients were friends and often together in the Engineers' quarters.

Underneath the Engineers' quarters on the ground floor is a large room in which soda water is manufactured and in which the band practises daily. This, of course, entails the presence of many natives in the place, and on the 8th May a Frontier soldier in charge of the soda-water machine was brought to the hospital complaining of yellow fever: the symptom that suggested such a diagnosis to him was that he urinated blood. He was detained in the mosquito-proof ward and examined—his temperature was 99 Fahr. and his tongue was clean—scleræ quite clear. The urine was saved and examined, but beyond being slightly deeper in colour than usual it was normal. The patient was given two ounces of castor oil and put on a diaphoretic mixture. He was detained in hospital until the 13th—five days—and discharged for duty. With our present knowledge of natives suffering from mild forms of yellow fever at only little inconvenience to themselves, it seems probable that this man whilst employed at the soda-water machine infected some stegomyia, which are always to be found in dark ground-floor rooms—in fact almost anywhere in Bathurst—and that these in turn found their way to the room above, in which the Engineers lived, with the result that two out of the three caught the disease, and that their friends, who were often in the building, became infected from the same source.

One Engineer sergeant living on the same floor as the other two, and three European non-commissioned officers living on the floor above, did not contract the disease, and this may partly be accounted for by the fact that none of them associated with the two who fell sick to any great extent, and seldom themselves entertained friends. I am inclined to think that this explains the probable cause of the outbreak, as the dates of incubation fit in so well; but it is a litttle surprising that out of 55 Syrians in the town all were found to be in good health, and they come in contact with the natives and are by no means protected from mosquitoes. It is possible that there may be another explanation of the outbreak.

The ss. "Akassa," from the Coast, was lying off Government Wharf on the 13th and 14th of May, and four at least of those that had yellow fever went on board and remained on the ship for some hours. Did the ship bring any infected stegomyia from some place down the coast? The ship's surgeon gave a certificate that there was no contagious disease on board, but report says that a man died before the ship reached Dakar. Whether this report has any foundation or not I am unable to say at present.*

* Subsequent enquiries failed to confirm the report mentioned by Dr. Hood or to establish any connection between the ss. "Akassa" and the outbreak.

After the post-mortem examinations had confirmed the diagnosis of yellow fever I considered it necessary to take all the precautions possible. With the assistance of the Officer in Command of the Frontier Force I got together four mosquito brigades to catch and kill mosquitoes in and about all Europeans' quarters.

The acting Superintendent of Police very kindly made a list of all Syrians and Levantines, so that they could be examined at once, and afterwards daily, by a medical officer. The Town Warden was engaged with a special gang examining European premises and contiguous native compounds for larvæ, and making a clean sweep of all receptacles capable of becoming breeding places for mosquitoes.

The Colonial Engineer examined all mosquito-proof houses and shelters and remedied all defects without delay, and erected new ones where required.

The Frontier barracks were vacated—the European non-commissioned officers were isolated at a house at Cape St. Mary and watched.

The quarters occupied by the sick were all sealed carefully and fumigated with sulphur. They are being kept sealed for further attention later on.

His Excellency went to Government House at Cape St. Mary, as his valet contracted the disease and died in a wing of Government House.

The whole of Government House has been sealed from top to bottom and thoroughly fumigated.

The two medical officers in the Protectorate have been brought to Bathurst. One is at the Cape looking after His Excellency, who is unwell, and the other is devoting his whole time to sanitary inspection work. I myself visit the European firms daily, and have persuaded the agents to each tell off a European clerk to maintain their respective premises in a sanitary condition.

Ships anchor 1,000 yards from the shore, and no direct communication is allowed—all cutters and boats going alongside are examined for mosquitoes and fumigated; the labourers and others employed are also examined by a medical officer. No cargo or passengers are taken on board.

The sealing up of the barracks and Government House has been a tremendous task, but they have been done under the supervision of the Town Warden and myself, with the aid of 40 Frontier soldiers kindly lent for the purpose by Captain Dobbin, and the Board of Health Staff. Even now, although over two hundredweight of sulphur has been burnt in these buildings within seven days of the outbreak of yellow fever, I do not recommend that that they should be inhabited by Europeans for at least three months.

The closest watch is being kept on all Europeans and Syrians, and at the slightest sign of illness they will be carefully attended to; but so long as Europeans live in quarters close to natives an outbreak of yellow fever is always liable to recur. The enforcement of the new Public Health Ordinance will undoubtedly improve matters, especially if it is amended to make the presence of larvæ a punishable offence.

Sierra Leone and Dakar were at once informed of the outbreak. Only mails and passengers from steamers were landed and homeward bound steamers were worked in quarantine, the labourers and others working the ships being under medical examination.

No further case occurred until July 6th, when the Assistant Engineer of the Government Vessels in the Gambia was reported infected (Case 55); this was followed by seven cases amongst Europeans and Syrians (Cases 56–62) until the latter end of August.

In his report (September 8th) on this renewal of the outbreak Dr. Hood said:—

I regret having to record a recrudescence of the disease after an interval of 42 days of apparent freedom.

Mr. D. (Case 55), the Acting Master of Government Vessels, reported that he felt unwell on the evening of July 6th, and he was at once removed to the screened European ward—typical symptoms of yellow fever were noticeable the following day, and the patient died on July 13th. Owing to the shortage of European quarters in Bathurst the Government was compelled to hire the only house procurable to accommodate Mr. D., and unfortunately this house was next to houses occupied by Syrians and natives. Although Mr. D.'s quarters were sealed and fumigated at once, a Syrian in the next house (Case 56) developed yellow fever during the following few days, and was transferred to hospital on the 10th July and died on the 12th.

The third case of this series (Case 58) occurred in Russell Street on July 15th, some 500 yards away, in a Syrian who developed a mild attack and recovered.

The fourth case was that of a European clerk (Case 57) who lived in a house 100 yards from that occupied by Mr. D., but separated by many small houses inhabited by Syrians, natives, and Moroccans. The same precautions were taken as before, but the patient died in hospital on the fourth day after exhibiting most marked symptoms of the disease.

The fifth case was that of a Roman Catholic brother (Case 59) who lived in the

middle of the town. This patient cycled to a mission station some 10 miles away on the 17th July not feeling very well. He died, undoubtedly of yellow fever, on July 23rd.

The sixth was a European clerk (Case 60), in the same firm as the fourth case, and was the only patient concealed during the outbreak. When discovered the patient was well screened, but suffering from typical symptoms. The intention was to take this patient on to a steamer before discovery, but unfortunately he died in hospital the following day just as the steamer left Bathurst.

The seventh case proved fatal in a Syrian (Case 61) who was taken ill on July 24th. This patient had only arrived in the Colony a few days previously, and he had occupied a room in close proximity to case 3 of this series.

The eighth and last case (Case 62) was the cashier of the bank, who lived in Buckle Street. He was taken ill on August 2nd. Although the symptoms were mild it was undoubtedly a case of yellow fever, and the patient recovered.

Thirty-eight days have elapsed since the last case of yellow fever occurred, and I hope this terminates the epidemic.

In looking up the records of the last epidemic of yellow fever in Bathurst that occurred, in 1900, I find that there were eleven cases amongst Europeans and Syrians, extending from May 23rd to October 30th, and that the death rate was about the same, and that all the cases occurred in the front street, except one, which was at the Catholic Mission. The similarity of the 1900 and 1911 outbreaks is most marked, and tends to support the view that the disease is probably brought by ships calling at this port, and when the disease is once established the wisest course to pursue is for all non-immunes to at once live elsewhere for at least three or four months. The construction of the houses, and their close proximity in the commercial parts of the town, render efficient fumigation absolutely impracticable. The greater number of the houses in Wellington Street join up, and have no intervening spaces; and most of them possess dark stores or cellars on the ground floor. Building regulations have been a dead letter, and vested rights are now so enormous that it is almost hopeless to rectify this evil. Not only are the houses unsuitable for European dwellings, but the formation of the island and the close proximity of native dwellings are a danger that is only possible to be overcome by segregation. Government quarters on the Clerkson Street side of McCarthy Square should be abandoned as such, and all those in Portuguese Town should be isolated by expropriating all natives living between Clifton Road and the river. Should a cantonment be built in the direction of Cape St. Mary for Government officials, many of the present quarters on the river front in Portuguese Town might be let to the merchants, who would never be induced to live any great distance from their stores. To deal with the Syrians and other non-immunes is more difficult, as they thrive in direct contact with the natives, and short of prohibiting their presence in the town, I am convinced nothing much can be done to prevent them contracting insect-borne diseases. At the least strict immigration laws like those enforced by the French Government on the West Coast should deter them from coming here in such comparatively large numbers.

On subsequent enquiry it was ascertained that there had been no increase in the native infant mortality during, or immediately preceding, these outbreaks in Bathurst.

Following the recovery of the last case of Yellow Fever during this outbreak, on August 28th, there was a period of quiescence for over two months, when the death of a French clerk occurred in Bathurst on November 18th (Case 63), after an illness and isolation of eight days. Post-mortem examination proving conclusively that death was due to Yellow Fever, the precautions previously alluded to were taken and the other West African Colonies were informed.

All steps were taken to trace the source of infection in this case, but without success. The patient had arrived in Bathurst from France via Dakar about three or four weeks before he died, and was in good health at the time of landing. When the case occurred all likely places of infection were visited, and all Syrians visited daily for three weeks. From August to November all ships calling at Bathurst had shewn clean bills of health. The patient stated that he always used a mosquito-net and did not go out into the town after dusk.

It is of interest to record that simultaneously with this case of Yellow Fever a member of the same firm in Bathurst was taken ill on the 15th of November with what it was decided by both medical officers in attendance was pernicious malaria. The case terminated fatally on November 21st. Although this is not considered to be a case of Yellow Fever its history is given (Case 64).

TABULAR STATEMENT OF THE CASES.

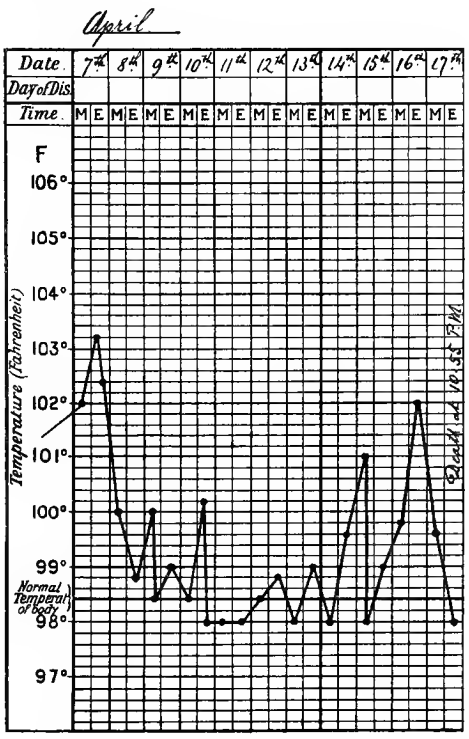
Place.	Case No.	Race.	Age.	Occupation.	Date.	Result.	Quinine Prophylaxis.	Blood examination for Malaria Parasites.	Remarks.
					1910.				
Freetown	1	Syrian ...	20	Trader ...	Apl. 7–17 ...	Death ...	Probably No	Malignant Tertian	Malaria followed by Yellow Fever.
	2	Syrian ...	—	Trader ...	Apl. 17 ...	Death ...	—	—	No details of illness.
	3	Syrian ...	23	Trader ...	May 4–5 ...	Death ...	Probably No	Negative	
	4	Syrian ...	—	Trader ...	May 5 ...	Death ...	—	—	No details of illness.
	5	Syrian ...	15	Trader ...	May 6–7 ...	Death ...	Probably No	Negative	
	6	European	42	Agent ..	May 9–14 ...	Death ...	—	Negative	
	7	Syrian ...	—	Trader ...	May 13 ...	Death ...	—	—	No details of illness.
	8	Syrian ...	25	Trader ...	May 18–25 ...	Death ...	Yes	Negative	Travelling in Protectorate before attack.
	9	European	50	Missionary	May 26–31 ...	Death ...	—	Negative	Ten years in West Africa.
	10	European	60	Trader ...	June 5–8 ...	Death ...	—	Not made ...	An ambulant case.
	11	European	28	Govt.Official	June 25–July 13	Recovery	Yes, regularly	Negative	Taken ill at Yonni in the Moyamba district; an ambulant case.
	12	European	30	Soldier ...	July 13–17 ...	Death ...	Yes, regularly	Negative	An attack of Malaria preceded the attack of Yellow Fever by seven days.
	13	Syrian ...	35	Trader ...	July 18–22 ...	Death ...	Probably No	Negative	
	14	Syrian ...	—	—	July 26 ...	Death ...	—	—	The post-mortem, of which there are no records, was thought to confirm a diagnosis of Yellow Fever.
	15	Negro ...	23	Clerk ...	July 30–Aug. 2	Death ...	No	Not made... ...	
	16	Negro ...	24	Labourer ...	Aug. 1–5 ...	Recovery	No	—	
	17	European	25	Trader ...	Aug. 1–17 ...	Recovery	Yes, regularly	Negative	An ambulant case.
	18	European	27	Govt.Official	Aug 11–20 ...	Recovery	Yes, regularly	—	
	19	Negro ...	34	Cook ...	Aug. 18–27 ...	Recovery	No	—	
	20	Negro ..	26	Labourer ...	Aug. 28–29 ...	Death ...	No	—	
	21	European	26	Clerk ...	Sept. 15–22 ...	Death ...	Irregularly ..	Doubtful	History of C_2H_6O; ambulant case.
Seccondee	22	European	29	Govt.Official	Mar. 19–24 ...	Death ...	Regularly ...	—	
	23	European	30	Agent's wife	Apl. 12–28 ...	Recovery	—	—	
	24	European	42	Agent ...	Apl. 26–30 ...	Death ...	Not known ...	—	
	25	European	26	Govt.Official	May 8–10 ...	Death ...	Not known ...	—	
	26	European	25	Missionary	May 9–13 ...	Death ...	—	—	An attack of Urticaria preceded the Yellow Fever.
	27	European	45	Contractor	May 9–12 ...	Death ...	Not known ...	—	
	28	Negro ...	—	—	—	Death ...	No	—	Not a native of Seccondee.
	29	Negro ...	—	Labourer ...	May 16 ...	Death ...	—	—	Not a native of Seccondee.
	30	European	35	Contractor	May 18–21 ...	Death ...	Not known ...	—	Ambulant case.
	31	European	33	Accountant	May 19–27 ...	Death ...	Yes, regularly	—	
	32	European	50	Missionary	May 20–23 ...	Death ...	Not known ...	—	Thirty years in Africa including leave.
	33	European	32	Govt.Official	May 22–25 ...	Death ...	Not known ...	—	
	34	Negress	—	—	May 23 ...	Death ...	—	—	

Place.	Case No.	Race.	Age.	Occupation.	Date.	Result.	Quinine Prophylaxis.	Blood Examination for Malarial Parasites.	Remarks.
					1910.				
Sawmills	35	European	38	Clerk ...	July 15–19 ...	Death ..	Yes, regularly	—	
Axim ...	36	European	40	Merchant...	July 12–15 ...	Death ...	Not known ...	—	
Lagos ...	37	Negro ...	30	—	July 28–29 ...	Death ...	—	Negative	
	38	Negro ...	45	Labourer ...	Aug. 5-7 ...	Death ...	—	—	
					1911.				
Accra ...	39	European	—	—	Feb. 6–24 ...	Death ...	—	Negative	
	40	European	—	Merchant...	Feb. 17–19 ...	Death ...	Not known ...	—	
	41	European	24	Merchant...	May 23–24 ...	Death ...	Yes, regularly	—	
	42	European	27	Merchant...	May 23–27 ...	Death ...	Yes, regularly	Negative	
	43	Negro ...	—	Labourer ...	May 24–31 ...	Recovery	No	Negative	Non-native of Accra, arrived there October 10th, 1910.
	44	Negro ...	30	Labourer ...	May 24–31 ...	Recovery	No	Negative	Non-native of Accra, arrived there in 1910.
	45	Negro ...	40	Clerk ...	May 25–June 3	Recovery	No	Negative	
	46	European	35	Engineer ...	May 22–26 ...	Death ...	Not known ...	Negative	
	47	European	35	Merchant ..	Aug. 26–Sept. 6	Death ...	—	—	
	48	European	29	Clerk ...	Dec. 20 ...	Death ...	Neglected ...	Not made ...	An ambulant case.
Avreboo	49	European	—	Agent ...	Dec. 20 ...	Death ...	—	—	
Bathurst	50	European	31	Govt.Official	May 19–23 ...	Death ...	—	Negative	
	51	European	32	Govt.Official	May 19–22 ...	Death ...	Not known ...	Positive malignant tertian... ...	
	52	European	23	Clerk ...	May 20–June 2	Recovery	Regularly ...	Not made ...	
	53	European	39	Servant ...	May 26 ...	Death ...	Not known ...	—	
	54	European	24	Engineer ...	May 26 ...	Death ...	Regularly ...	Not made ...	
	55	European	30	Engineer ...	July 6–13 ...	Death ...	Not known ...	—	
	56	Syrian ...	26	Trader ...	July 11 ...	Death ...	Not known ...	—	
	57	European	27	Clerk ...	July 16–18 ...	Death ...	Irregularly ...	—	
	58	Syrian ...	21	Trader ...	July 15–24 ...	Recovery	Not known ...	—	
	59	European	28	Missionary	July 23 ...	Death ...	Regularly ...	—	
	60	European	29	Clerk ...	July 23 ...	Death ...	Irregularly ...	—	
	61	Syrian ...	23	Trader ...	July 24–28 ...	Death ...	Not known ...	Not made ...	
	62	European	25	Clerk ...	Aug. 2–16 ...	Recovery	Irregularly ...	Not made ...	
	63	European	26	Clerk ...	Nov. 11–17 ...	Death ...	Regularly ...	—	
	64	European	—	—	—	Death ...	—	—	

CASE 1.

A Syrian Trader, aged 20 years

Previous History.—Owing to the patient's condition and his limited knowledge of English this was unobtainable.



History of Present Illness.—This was also unobtainable.

The patient was admitted to hospital on April 7th. His temperature on admission was 102°; his blood was examined microscopically; a large infection of the malignant tertian parasite was found. Injections and the oral administration of quinine caused the fever to subside. A re-examination of the blood shewed no indication of active malaria. Progress was maintained up to the morning of the 14th when he had a rigor and the temperature rose to 99·6°.

On April 15th, at 8 a.m., the temperature was 101°; it oscillated between 101° and 99° until April 17th. On this day he had pain over the spleen, which was slightly enlarged; he was very restless and worried and had vomited a good deal. The vomited matter, at first dark green, became almost black before death at 10.55 p.m. At no time was jaundice marked.

Post-mortem Examination not made.

CASE 2.

A Syrian Trader who died suddenly at home on April 17th.

No details are given.

CASE 3.

A Syrian Trader, aged 23 years.

Previous History.—The length of the patient's residence in Africa, his previous tropical experience, his previous illnesses, his habits as regards quinine prophylaxis, and his movements before the present illness could not be obtained.

History of Present Illness.—The earlier part of this could not be obtained. He was said to have had fever and slight epistaxis on May 2nd.

On May 4th, at 9.45 a.m., he was admitted to hospital with a temperature of 102·6° and a history of a profuse epistaxis in the morning. He was in a dazed condition and very restless, and his skin was of a dirty yellow colour.

On the morning of May 5th copious black vomit and the passage of a stool of the same colour occurred; the vomiting continued all day, and just before death the patient bled profusely from mouth, nose, and bowel.

During his illness the blood was examined; no malaria parasites were found and there was no mononuclear leucocytosis.

Post-mortem Examination was not made, the relatives refusing permission.

CASE 4.

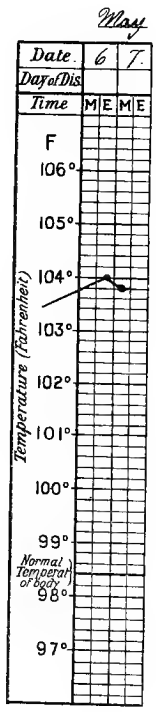
A Syrian Trader who died at home.

No further details were obtainable.

CASE 5.

A Syrian Trader, aged 15 years.

Previous History.—The previous tropical experience of this patient, the length of his residence in West Africa, his previous illnesses, his habits as regards quinine prophylaxis, and his movements immediately before the present illness could not be ascertained.



History of Present Illness.—The earlier part of the history was not obtainable.

On May 6th, at 6 p.m., he was admitted to hospital with a temperature of 104°; the skin and scleræ were pronouncedly yellow; the eyes were injected and bright; he was restless and delirious. An enema was given without effect, the bowels apparently being empty.

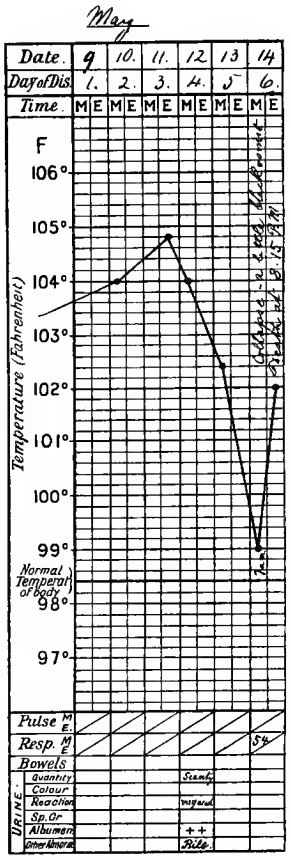
On May 7th, in the morning, the temperature was 103·8°. No malaria parasites were found on examination of the blood. At 11 a.m. the patient had "black vomit" and died.

Post-mortem Examination was not made, owing to the refusal of permission by the friends of the patient.

CASE 6.

A Mercantile Agent, aged 42 years.

Previous History.—The previous tropical experience of this patient, the length of his residence in West Africa, his previous illnesses, and his habits as regards quinine prophylaxis were not recorded. He had not been out of Freetown for some time before the attack.



History of Present Illness.—On May 9th he had a "touch" of fever accompanied by headache.

On the morning of May 10th he had a rigor, and the temperature rose to 104°.

On May 11th, at about 5 p.m., medical advice was first sought; his temperature was then 104·8°. There was severe headache and pain in the loins; the face was flushed and the skin yellowish-red, almost the colour of brawn.

On May 12th the patient was removed to the Nursing Home. On admission the peculiar aspect of the patient was remarked by the nursing staff, who very aptly described his eyes as very bright and sharp looking. The blood was examined twice, an interval of twelve hours intervening, by two medical men independently; no malaria parasites were found, although the patient had had little or no quinine before the blood examination. The urine was examined: it was scanty, very acid, and found to be highly albuminous; traces of bile were also found in it. The tongue was small, clean at the edges, but coated in the centre with a greyish fur. The breath was very foul. Neither cold packs nor the induction of diaphoresis reduced the temperature, which continued high, sinking slowly from 104° on admission to 102·4° on the morning of May 13th.

The patient had a fair night, but in the morning of May 14th symptoms of collapse were noticeable; the temperature at 7 a.m. was 99°; respirations were 54 per minute; the pulse was slow and fairly full. The lungs were now congested, and rattling respirations continued all day. The temperature began to rise; saline rectal injections and small doses of caffeine combined with antipyrin were given. The temperature rose to 103° in the rectum, and his condition became worse. He vomited a little "black vomit" at 6 p.m., and at 8.15 p.m. there was a profuse discharge of tarry liquid from the mouth and nose, and he died.

Post-mortem Examination.—There was a general yellow discolouration of the body associated with irregular blotchy bluish areas distributed not only in dependent parts.

The brain weighed 3 lb. 4 oz.; it was not unduly congested, but œdema of the pia arachnoid was marked over the frontal area.

The heart weighed 13 oz.; it was fatty; the muscle substance was friable and dry. The valves were of a yellowish colour.

The lungs weighed—the right, 20 oz.; the left, 17 oz. There was some posterior congestion of the left lung.

The spleen weighed 18 oz., was friable and almost diffluent.

The liver weighed 72 oz., was enlarged, fatty, and of a dull yellow colour.

The kidneys weighed—the right, $6\frac{3}{4}$ oz.; the left, 5 oz. The right kidney was markedly congested.

The stomach contained dark brown mucous fluid; there was well marked arborescent injection of the stomach wall.

The intestines contained fluid similar to that in the stomach.

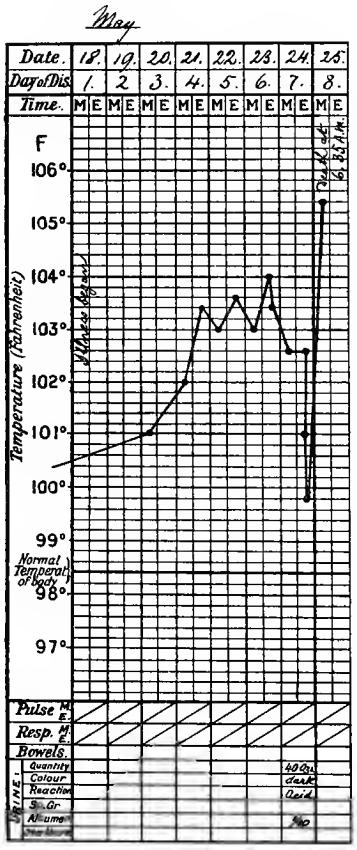
CASE 7.

A Syrian Trader who died suddenly at his home without being medically attended.

CASE 8.

A Syrian Trader, aged 25 years.

Previous History.—It is doubtful whether the patient had any tropical experience previous to that in West Africa. The length of his residence and his previous illnesses were not recorded. He took quinine regularly; he had been travelling in the Protectorate before the present illness.



History of Present Illness.—On May 18th the patient complained of feeling tired and of yawning and stretching himself frequently.

On May 19th all the above feelings were exaggerated.

On May 20th he took a dose of Epsom salts, but the tiredness was not relieved thereby. He sought medical advice at 6 p.m., when the temperature was 101°. There was neither headache nor vomiting; he complained of malaise, great thirst, and of a griping pain in the stomach. A microscopical examination of the blood revealed no malaria parasites. Phenacetin grs. x was prescribed, a diaphoretic mixture was given, and at bedtime he was given calomel grs. iv.

On May 21st, at 8 a.m., the temperature was 102°; Eno's fruit salts were given, and the bowels were well opened; the diaphoretic mixture was continued during the day. The evening temperature was 103·4°, and he felt better. Quinine grs. viii was given.

On May 22nd the morning temperature was 103°; the tongue was very furred and foul. "Sternberg's" mixture was given during the day. During the afternoon there was some diaphoresis. The evening temperature was 103·6°; he was very distressed and uneasy, and there was epigastric tenderness. At 6 p.m. a draught containing bismuth and morphia was given. At 9 p.m. the patient complained of being unable to sleep and trional grs. x was given.

On May 23rd, in the morning, the temperature was 103°; he felt much better, but the conjunctivæ were slightly jaundiced and he looked tired and worn out. The evening temperature was 104°. The pain and uneasiness had increased. The bowels had been moved twice during the day, the motions being loose but natural. A hypodermic injection of morphia gr. $\frac{1}{4}$ was given and the patient was removed to hospital. He was given nourishment, which he took fairly well, at short intervals; he was restless till 10 p.m., after which time he slept until the morning.

On the morning of May 24th the temperature was 102·6°; he strained a good deal in his attempts to pass water, which were ineffectual, and, as the bladder was distended, a catheter was passed and 20 ozs. of urine were drawn off. The urine was of a dark colour, acid in reaction and contained $\frac{1}{10}$th of albumen. He was drowsy, his face pinched, he looked worried and was distinctly jaundiced. During the afternoon the patient had alternate phases of quiet and restlessness and from 2 p.m. he gradually became comatose. The pulse was 104, but became slower later. He was given calomel grs. v. One pint of urine was again drawn off by catheter. At 7 p.m. the axillary temperature was 101°, but the skin felt cold and clammy.

He was restless all night, became delirious and finally sank into a condition of "coma-vigil."

On May 25th the temperature rose rapidly to 105·4 between 5 and 6 a.m. He became quiet and died at 6.35 a.m.

Post-mortem Examination.—The skin and scleræ were slightly yellow.

There were irregular bluish mottled spots or patches best marked on the scrotum and limbs.

The lungs weighed—the right, 16 oz., the left, 17 oz., and were healthy.

The heart weighed 8 oz. There was a small sub-pericardial hæmorrhage in the intra-ventricular groove and some yellow clot in the cavities.

The pericardium contained an excess of straw-coloured fluid.

The liver weighed 40 oz. and was of a yellow colour ("boxwood"), the margins were sharp.

The stomach contained a large quantity of black fluid of acid reaction. The mucous membrane at the cardiac end was congested and there were some punctate hæmorrhages.

The small intestine contained similar material to that in the stomach, also acid in reaction.

The transverse colon contained light coloured fæces of feebly acid reaction.

The kidneys weighed—the right, 5 oz.; the left, $6\frac{1}{2}$ oz. They were slightly congested and enlarged.

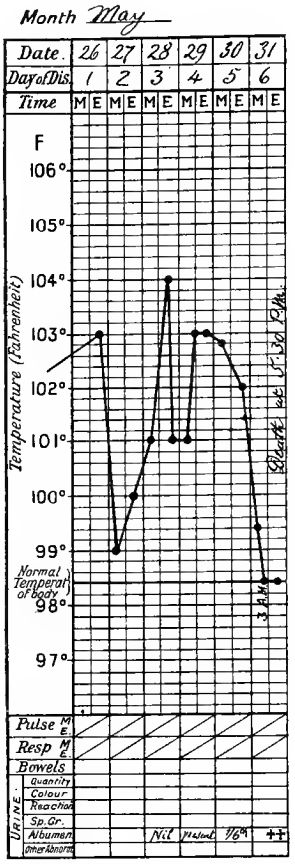
The spleen weighed 5 oz., was soft, but not enlarged.

The bladder contained 10 oz. of urine.

CASE 9.

A Missionary, aged about 50 years.

Previous History.—The patient had resided in West Africa for ten years; his previous illnesses, tropical experience, and his habits as regards quinine prophylaxis were not known.



History of Present Illness.—On May 26th he had two short and distinct rigors soon followed by severe headache; he at once took quinine grs. x and followed them with grs. xxv more within 24 hours. The temperature that night was 103°.

On May 27th the temperature ranged between 99° and 100° all day. Headache was severe and continuous; he took calomel grs. iv at bedtime.

On the morning of May 28th he passed four copious green stools. The temperature was 101°. He was first seen by a medical man in the afternoon when the temperature was still 101°. The tongue was coated, fissured, and very foul. The blood was microscopically examined; no malaria parasites were found and there was no mononuclear leucocytosis. The urine contained no albumen; he was given Apenta water oz. iv. and the bowels were opened twice. At midnight the temperature was 104° and there was some slight cardiac distress.

On May 29th, at 2 a.m., he was very restless and agitated. A hypodermic injection of hyoscyamine hydrobromide and morphia was administered, after which the patient slept till 6 a.m. The bowels were twice opened in the morning, the motion being "pea-soupy" and foul. At 8 a.m. the temperature was 101°. Diaphoretic mixture was given every two hours in doses of an ounce. The blood was again examined microscopically; no malaria parasites were found. The urine was found to contain albumen. The tongue was dry and covered with brownish fur. At noon the temperature was 103°. At 5 p.m. the temperature was still 103°; he was removed to the Nursing Home.

On the morning of May 30th the temperature was 102·6°; he was restless. "Sternberg's" treatment was commenced. The urine contained $\frac{1}{6}$th albumen. He was given oleum ricini oz. $\frac{1}{2}$ in an emulsion; he passed two copious liquid grey stools which were excessively foul. At 6 p.m. the temperature was 102°. The breathing became very laboured. The pulse rate was from 94 to 100 per minute.

He was given stimulants freely during the night.

On May 31st, at 2 a.m., the temperature was 99·4°. The pulse rate was 100. At 3 a.m. the temperature was 98·4°. The urine was highly albuminous. He took all stimulants and nourishment without any trouble. Sinapisms were applied over the heart several times. Nitrate of amyl gave temporary relief to the cardiac symptoms. At 9.15 a.m. hypodermic injections of strychnine and digitalin were given with good effect, maintained for a time by

two minim doses of nitro-glycerine given as required. At noon the cardiac distress increased. The urine was suppressed. He was more or less comatose; there was twitching of the muscles of the face and neck. At 3.50 p.m. he had black vomiting and died. Immediately after death the face was of a bright yellow colour, but this speedily disappeared. Bluish discolourations were noticed about the neck, arms, penis, and scrotum.

Post-mortem Examination.—This was made at about 5 p.m. on May 31st and was limited to an examination of the stomach and liver.

The conjunctivæ were slightly yellow.

The stomach contained a large quantity of almost black fluid. The stomach wall was congested, the mucous membrane being swollen and injected in patches with a few punctate hæmorrhagic spots.

The small intestine contained similar material to that in the stomach.

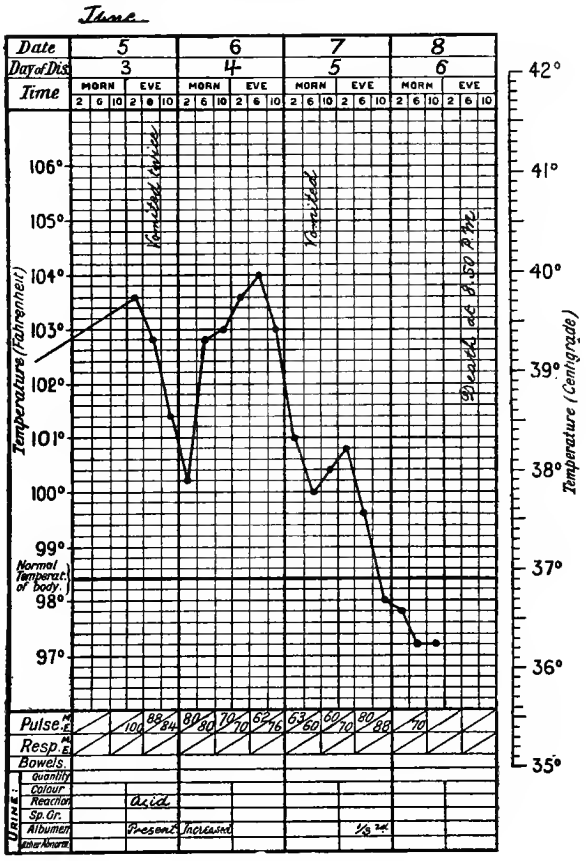
The liver was greatly congested. There was no " boxwood " appearance.

Laboratory Report.—On examination, during his illness, of the patient's serum for the Widal reaction a negative result was obtained.

CASE 10.

A Trader, aged about 60 years.

Previous History.—Before becoming a trader the patient, who was a sailor, had lived a seafaring life, travelling to and from West Africa for about 20 years. His previous illnesses and his habits as regards quinine prophylaxis were not known. He had been living in Freetown for some time before his present illness.



History of Present Illness.—On the morning of June 3rd he stated that he had had a restless, sleepless night and complained of feeling agitated and worried.

On June 4th he had a severe rigor followed by fever; he went to work however, but while at business vomited bile and dark green fluid. He returned to bed and slept almost continuously until noon on June 5th, when he awoke with headache and sought medical advice. On examination he was very flushed, his skin hot and dry, and his eyes were injected and bright. The temperature was 104·6°. The pulse rate 72 to the minute. There was no jaundice. The urine was acid in reaction and albuminous. The tongue was coated in the middle, the edges being clean. The bowels had been moved twice. At 5.30 p.m. he was admitted to hospital. His temperature then was 103·6°. The pulse rate was 90 to the minute. The respirations 20. He was restless. Sternberg's treatment was commenced and calomel was given at bedtime. His sleep was twice interrupted during the night by going to stool. The motions were copious, of a grey colour, and offensive. He vomited during the night on to his mosquito curtain, which was stained black.

On June 6th the urine contained more albumen. He was nauseated and had severe headache; his face was turgid and the eyes were more injected. Subsultus tendinum was very marked in the calf muscles. A carminative was added to the mixture with beneficial result. During the night the temperature fell to 100°; pulse 62 to 76. The albuminuria had now increased to nearly $\frac{1}{3}$.

On June 7th the temperature fell during the day 100° to 98°. He was restless and worried. The bowels were moved twice. At 5.30 p.m. the patient vomited "black vomit"; the vomiting increased in severity; he vomited five times between 5.30 p.m. and 8.40 p.m. The vomited matter increased in quantity and in its depth of colour, the last vomit being uniformly black and of thick consistency.

A powder containing:—

Cerium Oxalate	gr. VII.
Calomel	gr. $\frac{1}{3}$
Sodii Bicarb.	gr. VII.

given every three hours, apparently checked the vomiting. Hiccough was troublesome but was eased by a sinapism. The urine contained still nearly $\frac{1}{3}$rd of albumen. During the afternoon and night the temperature remained at 98°.

On the morning of June 8th the temperature was 97·2°. The pulse rate was 70 to the minute and fairly full. He looked and felt better. At 6.30 a.m. he vomited grey matter. At 9.25 a.m. he vomited "black vomit." At 11 a.m. he again vomited "black vomit" and was restless. At 5 p.m. the temperature was 97°; he was delirious and restless and the scleræ were very yellow. At 8.45 p.m. he was very restless. A profuse flow of "black vomit" was followed by the vomiting of dark blood. At 8.50 p.m. he died.

No blood examination was made during the illness.

Post-mortem Examination.—The body was well nourished. There was marked yellow colouring of the skin of the whole body and also of the conjunctivæ. There were patches of ecchymosis in the skin of the legs and there was darker colouration of the scrotum.

The abdominal parietes showed a large fatty covering stained deeply yellow.

The liver was slightly retracted under the costal margin; it showed a yellow mottling through the peritoneal coat, which stripped off readily; its substance was soft and very friable; fatty degeneration was marked. "Box-wood" liver.

The stomach showed ecchymoses under the peritoneal coat and contained a dark bloody fluid. The mucous lining was deeply congested and there were numerous petechial hæmorrhages over the whole of its surface.

The small intestines were of a dark leaden colour and were distended. There were ecchymoses under the peritoneal surface and they contained a thick black tarry material.

The mesentery was very fat and stained yellow.

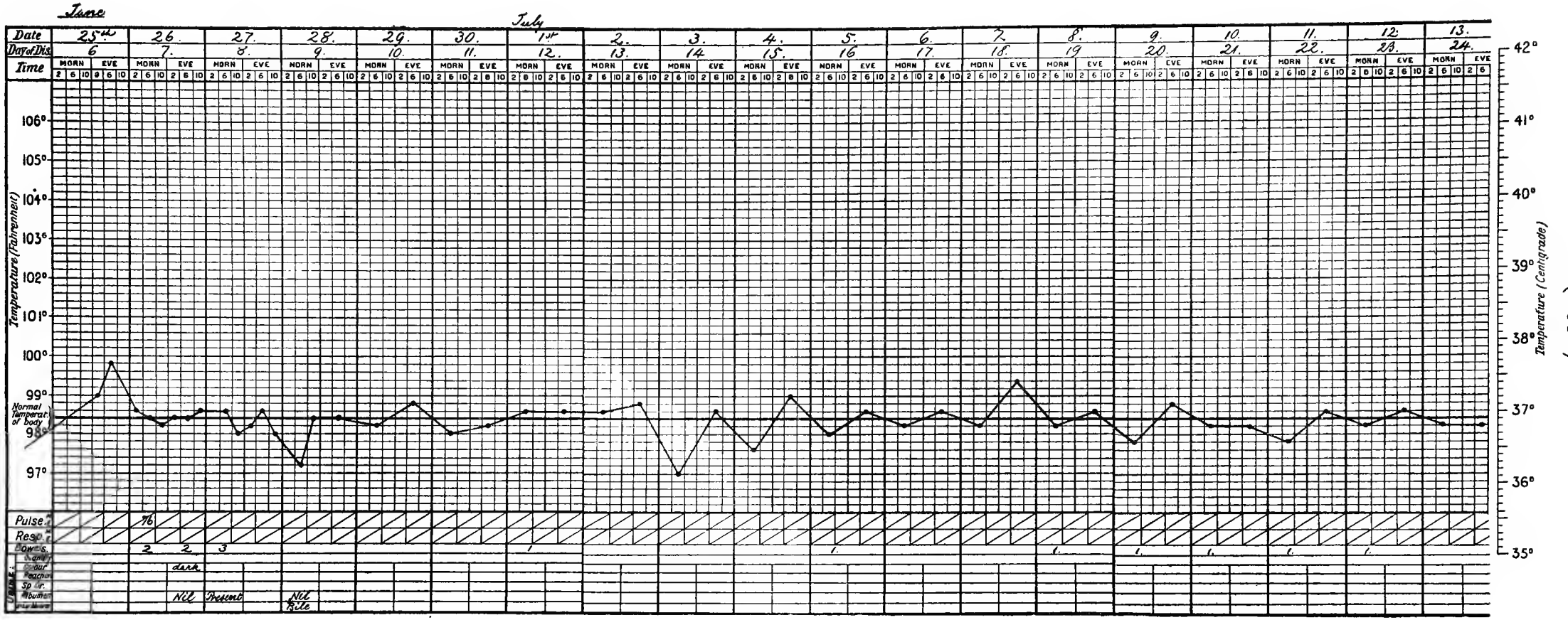
The spleen was somewhat enlarged, congested, and very friable.

The heart was covered with a thick layer of fat especially on the right and posterior surfaces. The pericardium contained two ounces of deeply stained yellow fluid.

CASE 11.

A Government Official, aged 28 years.

Previous History.—The patient had no tropical experience previous to that in West Africa. He had resided six and a half months on the Coast. His previous illnesses were not recorded. He had taken quinine regularly. He had been travelling in the Protectorate before the present illness.


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July
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104°
103°
102°
101°
100°
99°
98°
97°
Temperature (Fahrenheit)
Normal Temperat. of body
42°
41°
40°
39°
38°
37°
36°
35°
Temperature (Centigrade)
Pulse
Resp.
Bowels
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2
2
3
1
1.
1.
1.
1.
1.
1.
URINE:
Quantity
Colour
Reaction
Sp. Gr.
Albumen
dark
Nil
Present
Nil
Bile

History of Present Illness.—On June 20th he was inspecting a house in the sun at mid-day at Yonni, in the Moyamba district, and, feeling the heat, retired into the shade in order to recover. He could not eat his lunch. His temperature that afternoon was 101·8°. He slept for four hours and took quinine grs. xxv.

On June 21st the patient remained in bed all day at Yonni. The temperature remained at about 102° throughout the day. He vomited once but there was nothing to note in the vomit.

On June 22nd he returned to Moyamba—the temperature was not taken.

On June 23rd he remained in bed all day, the temperature rising from 101·8° to 103°.

On June 24th the temperature rose from 99° to 100·4°. He was first seen by a Medical Officer this day.

On June 25th the patient was brought down from Moyamba to the Nursing Home at Freetown; his temperature was 99° on admission.

On June 26th calomel and seidlitz powder were administered and the bowels were moved four times during the day. The urine was of a dark colour; no albumen was present in it, but it contained a large quantity of bile.

On June 27th the temperature fell to normal; the urine still contained bile, but no albumen was present. His blood was examined microscopically; no malaria parasites were found. The skin and conjunctivæ were jaundiced. The bowels were moved three times. He was given a mixture containing ammonium chloride and dilute nitro-hydrochloric acid.

On June 28th, at 6 a.m., the temperature was 97·4°. He felt better. The urine still contained bile but not albumen.

From June 29th to July 1st his progress continued satisfactory. Jaundice was still pronounced and some slight gastric distress was complained of.

On July 2nd he complained of feeling limp; he looked better, however, and the jaundice was decreasing.

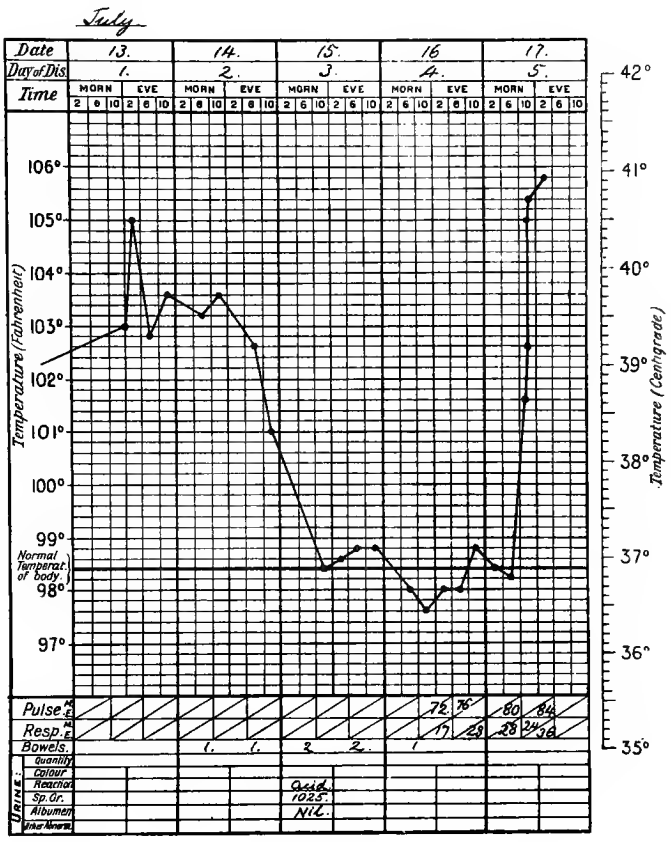
On July 15th progress was still uninterrupted. The jaundice had almost disappeared. He was allowed a little exercise.

The patient recovered.

CASE 12.

A Soldier, aged 30 years.

Previous History.—The patient had been in West Africa four months, and had taken quinine regularly. Previous tropical experience: the patient had served in Bermuda for four years and two months. He was stationed at Murray Town Battery, from whence he was admitted to the Military Hospital on June 29th for malaria—numerous malignant tertian parasites were found on a microscopical examination of the blood. He was treated with intramuscular injection of quinine bihydrochloride and quinine mixture. He was discharged from hospital on July 6th, returning to Tower Hill Barracks to attend daily as an out-patient for twelve weekly injections of quinine.



History of Present Illness.—On July 13th at about 10 a.m. the patient said that he suddenly became ill, feeling very hot and weak, but that he had had no rigor. He immediately reported sick, and was re-admitted to hospital with fever diagnosed as malaria on account of a differential leucocyte count showing a large mononuclear leucocytosis of 15·9 per cent, although no malaria parasites were found.

After thirty-six hours in hospital symptoms of yellow fever supervened.

During the interval between the patient's discharge and readmission to hospital no evidence could be obtained that he had ever left Tower Hill, the city of Freetown being out of bounds for all troops at this time.

He was admitted to hospital at 12 noon, and was looking pale, haggard, and weak; his temperature was 103°. The pulse rate was 90. His temperature soon afterwards rose to 105°. He was given phenacetin grs. x and caffeine grs. iii at once; he was sponged and a diet consisting of milk and soda water, tea and cocoa was ordered. He passed a quiet day. At 6 p.m. his temperature was 102·8°, he seemed to be looking better and took his nourishment fairly well. At 10 p.m. the temperature was 103·5° and he felt inclined to sleep.

July 14th: He had slept badly during the night and passed one motion; he was, however, looking better in the morning. An intramuscular injection of quinine was given. His temperature was between 102° and 103°; pulse rate 90. During the day he vomited a dark, "coffee-ground" vomit several times. He had no inclination for food but felt thirsty; he, however, took tinned milk badly. The bowels were again moved in the evening. The temperature was 101° and the tongue fairly clean.

The patient passed a restless night, vomiting several times a very dark stringy black coffee ground vomit.

On July 15th, in the morning, he looked very much distressed and worried about himself. Vomiting came on suddenly and was gushed up without much effort. At 10 a.m. the temperature and pulse rate were normal. A second intramuscular injection of quinine was given. The skin and scleræ were now noticed to have a distinct yellowish tint. There was no marked enlargement of liver or spleen. Bicarbonate of soda, salicilates, and bismuth were given throughout the day without much benefit. He passed four small motions. The evening temperature was normal.

July 16th. He passed another restless night and appeared no better in the morning when the temperature was normal, the pulse rate was 72, but it was not so strong. The urine acid, its specific gravity 1025, contained no albumen. The vomiting still continued every hour. Iced champagne dr. i, Tr. Iodi dr. i was given every three hours but had little or no effect. There was complete suppression of urine all day. Hot turpentine stupes were applied to the loins. The extract Casa Bereana Liquidum drs. ii was given and vomited immediately. The tongue was clean and very pointed. At 10.30 p.m. the patient was taken off the former treatment and put on Sternberg's mixture every half hour. A soft catheter was passed into the bladder and two and a half ounces of reddish-coloured urine were drawn off, which was found to be loaded with albumen. A nutrient enema containing the yolk of two eggs, brandy oz. i., milk ad. oz. iv. given every four hours, was fairly well retained. Trional was not given, on account of the vomiting.

On July 17th the patient passed another restless night: nothing seemed to do him any good and he soon passed into a state of collapse, becoming unconscious at 8.30 a.m. At 10.30 a.m. the pulse was almost imperceptible. A hypodermic injection containing Liquor Strychninæ Hydrochloratis ℥viii was given and improved the pulse somewhat. At 11.15 a.m. one pint of saline solution was infused into the chest wall, and saline enema—one pint—was also given. Hot fomentations were applied to the epigastrium and over the cardiac area. Ether ℥x was injected hypodermically. During the last three hours of his life the patient's fists were closed, the muscles of his arms were in a state of tonic contraction, both arms being folded across the chest. He was too weak to vomit; a little vomited matter was swallowed again. The temperature began to rise and stood at 105·4° just before death, rising to 105·8° after death. Just before death he had a spasmodic attack of contraction of all the muscles of the body.

Throughout the patient's stay in hospital he was kept under a mosquito net.

Post-mortem Examination.—The skin and scleræ were of a yellower colour than was the case during life.

The stomach was full of a "coffee ground" acid liquid, which did not contain bile. There were specks of capillary injection in the stomach wall.

The intestines were not distended; there were no petechiæ on their peritoneal surfaces.

The small intestine was filled with matter like that found in the stomach. The large intestine was normal.

The liver weighed 31 lbs. 13½ ozs. A typical nutmeg appearance was noted; its substance was very friable.

The spleen weighed 10½ ozs., was enlarged, congested, and fairly firm.

The kidneys weighed 13½ ozs., were congested, and fairly firm.

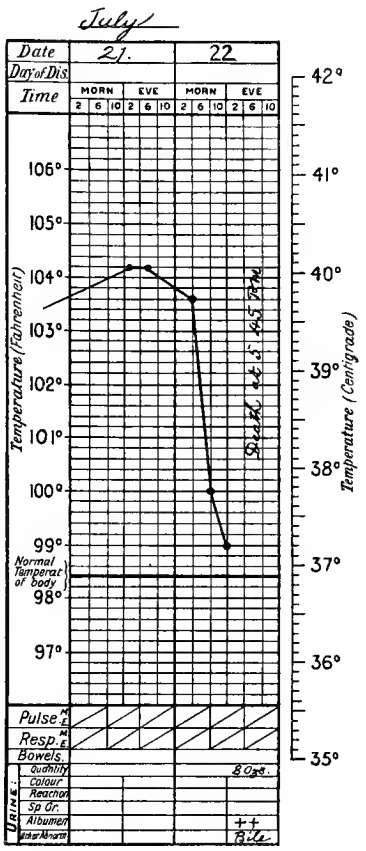
The bladder contained half an ounce of blood-stained urine.

The lungs were emphysematous.

CASE 13.

A Syrian Woman, aged 35 years. By occupation a Trader.

Previous History.—The patient's previous tropical experience, her length of residence in West Africa, her previous illnesses, and her habits as regard quinine prophylaxis were not known. She had not been out of Freetown for some time before her present illness. She had had attacks of fever on and off for some time.



History of Present Illness.—She had been ill three days, vomiting and suffering from looseness of the bowels for that time. She was first seen by a medical man at 1 p.m. on July 21st. She then had an anxious expression, was slightly jaundiced, and complained a great deal of cramping pains in the arms and legs. Her temperature was 104·2°. The bihydrochloride of quinine grs. x was injected intramuscularly, and she was removed to hospital, placed under a mosquito curtain, and given a further injection of quinine bihydrochloride grs. x. A microscopical blood examination showed no malaria parasites. The tongue was clean. There was tenderness in the epigastric region, and she vomited grey liquid material—not black—once in the evening. The temperature was still 104·2°. She passed per rectum a stool which looked like injested rice. The cramp pains became more severe.

On July 22nd the temperature at 4 a.m. was 103·6°, and at 8 p.m. 100°. She was sweating. She was also collapsed, and vomited black "coffee-ground" material. Brandy and strychnine were given. At mid-day the temperature was 99°. She had not passed urine since admission. The urine drawn off by catheter—about 8 ozs. in quantity—was bile-stained and contained much albumen. At 2.30 p.m. she was dying; her extremities were cold and she was pulseless, her respirations were gasping. The end came at 5.45 p.m.

Post-mortem Examination.—Post-mortem staining was well marked on the back. The stomach contained a quantity of black fluid, and its mucous membrane was studded with punctiform hæmorrhages.

The liver was greyish in colour, but the light was too bad to permit a proper examination of it to be made.

CASE 14.

A Syrian who died suddenly, in a house a few doors from that occupied by Case 13, without medical attendance.

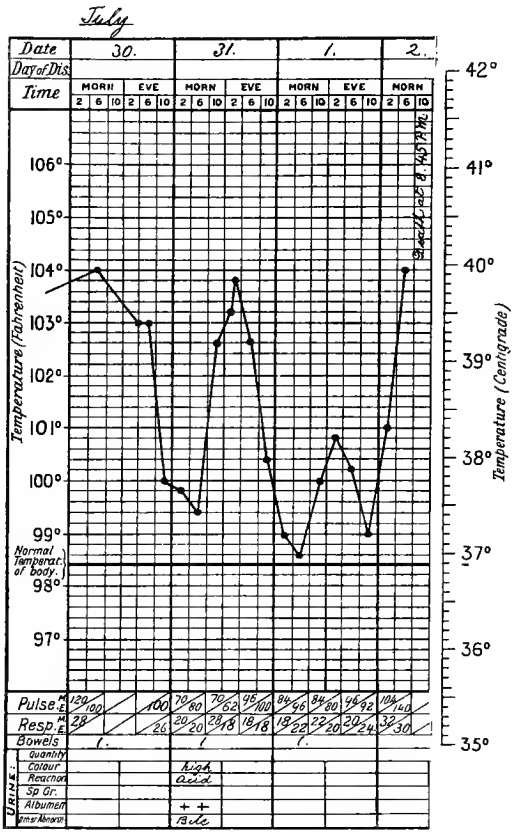
A post-mortem confirmed the diagnosis of Yellow Fever in this case.

There are no details either of the illness or of the post-mortem examination.

CASE 15.

A Negro, aged 23 years. By occupation a clerk on the railway.

Previous History.—The patient had never been out of West Africa. His previous illnesses were not recorded. He had not been in the habit of taking quinine.



History of Present Illness.—He stated that he had been ill since July 27th, suffering from fever and much pain in the back and chest; that he was treated as an out-patient and went home. On July 28th the previous symptoms were aggravated and he was unable to present himself at the hospital for treatment as an out-patient. He was visited at home by his doctor. Throughout the day he vomited nearly all his food.

On July 29th he was again visited by the doctor and admitted to hospital on July 30th when his temperature was 104°; he complained of pain in the abdomen especially in the hepatic area. His general condition was weak. He stated that vomiting was troublesome, and that the vomited matter was of a yellowish green colour and liquid. The bowels were freely opened. The pulse rate was 120; the respirations 28; the tongue was coated; the eyes were jaundiced. At 10.0 p.m. the temperature was 103°.

On July 31st at 6 a.m. the patient felt a great deal better. He had slept fairly well and the temperature was 99·4. The pain in the chest and abdomen was a little better than on the previous day. The urine was highly coloured, there was much deposit in it. Its specific gravity was 1025, it was acid in reaction, highly albuminous, and bile was present in it.

The patient was delirious and somewhat restless during the night.

On August 1st at 6.0 a.m. the temperature was normal. The patient was very weak. The eyes were very much jaundiced. The urine was highly coloured and contained much deposit. He vomited the medicine given him once during the day and passed one motion of a yellow colour.

He was somewhat delirious during the night and passed his urine into his bed.

He looked very weak and restless on the morning of August 2nd. At 6 a.m. the temperature was 104°, the pulse 140 and the respirations 30. A hypodermic injection of digitalin and strychnine was given; at 8.45 a.m. the patient died in convulsion, the temperature being 104°.

No microscopical blood examination was made during the patient's illness.

Post-mortem Examination.—A limited examination only was allowed.

The stomach contained "coffee-grounds." A portion near the cardiac end was marked with arborescent and congested capillaries.

The liver was of a typical boxwood colour.

CASE 16.

A Negro, aged 24 years.

Previous History.—The patient had never been out of West Africa. His occupation and previous illnesses were not recorded. He was not in the habit of taking quinine. He had not been out of Freetown for some time before the present illness.

History of Present Illness.—On August 1st the patient was admitted to hospital complaining of fever and abdominal pain especially marked over the hepatic area. He said that he first felt ill on July 30th, and that he had been vomiting a great deal and had scarcely been able to retain any food or medicine. His scleræ were very much jaundiced, his temperature was 98·4°, pulse 60 and respirations 16 to the minute and feeble. The tongue was furred, the liver edge could be felt one finger's breadth below the costal margin, and the liver itself was tender on pressure. The urine was dark coloured and contained a trace of albumen.

The bowels were well opened during the night. On August 2nd in the morning he felt better; jaundice was still present and the liver pain was better. The temperature was normal. There was no albuminuria. He slept well in the night, but in the morning of August 3rd he still complained of abdominal pain; there was no albuminuria.

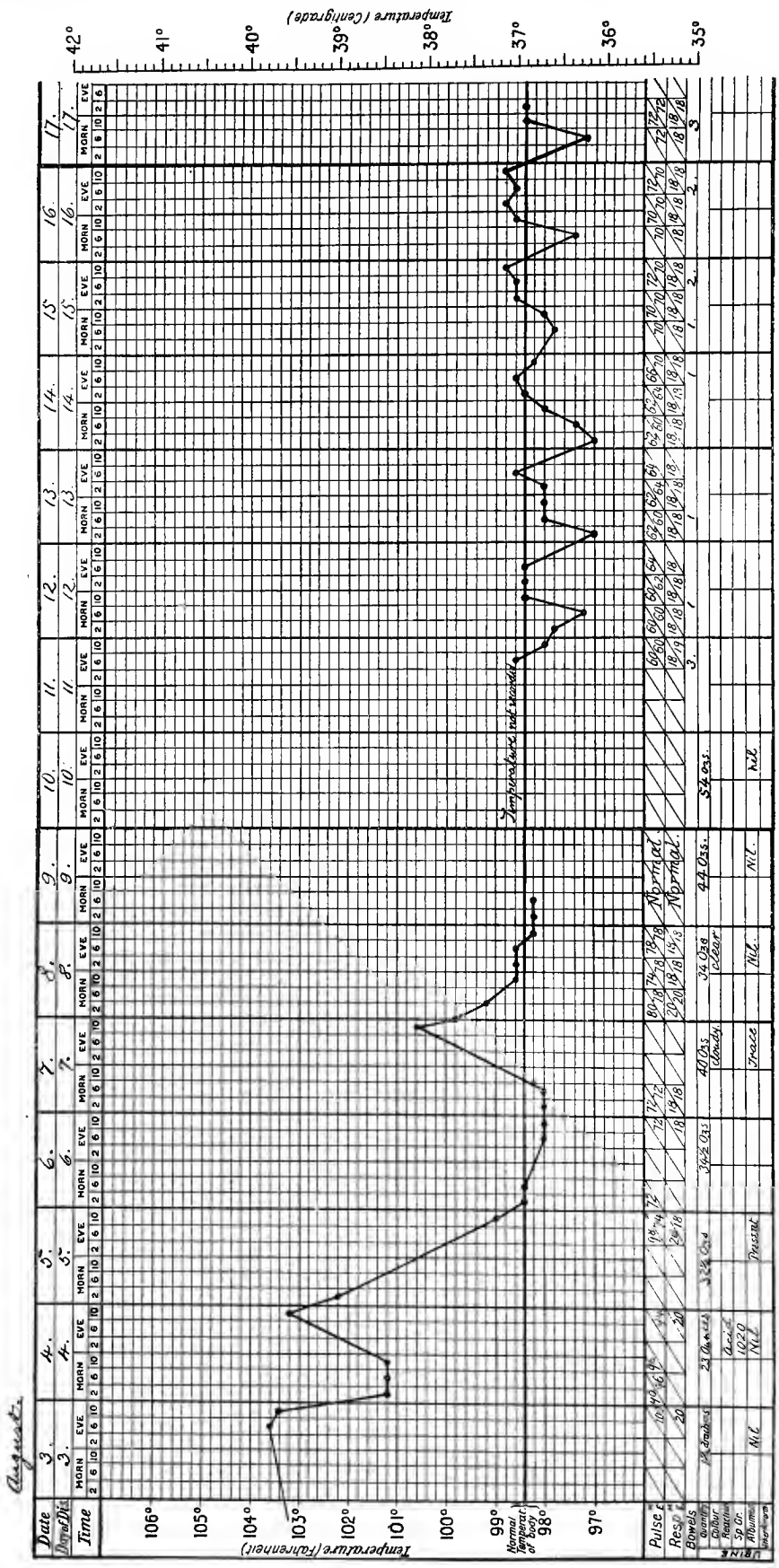
On August 4th the patient felt very well. There was no jaundice nor albuminuria and the temperature was normal.

On August 5th the patient was discharged from hospital.

CASE 17.

A European Trader, aged 25 years.

Previous History.—The patient had been in West Africa for one year and three months. He had had no previous tropical experience. He had taken quinine regularly. He had been in charge of a shop in Kissy Street in a district where a large number of Syrians and natives resided.



History of Present Illness.—The present illness commenced on August 1st. He felt generally indisposed and had some fever during the day, and in the evening suffered from chills on going to bed.

On August 2nd he still felt unwell, but went to work. He passed his urine freely all day. He again suffered from chills at night. He took some Epsom salts at bed time, which purged him well and consequently also prevented sleep to some extent.

On August 3rd he felt worse; there were pains in the back and legs, and headache. He again went to work. At 11 p.m. he returned home feeling thirsty. A drink of Perrier water was returned, a yellow tinge being noticed in the vomit. At 12.30 p.m. he first sought medical advice. His skin was then hot, and he had just begun to perspire. The face was flushed and he complained of a racking frontal headache with pains in the lower extremities. The temperature was 103·4°. Pulse rate, 120. The tongue was coated in the centre, but its edges were red. There was neither jaundice nor hepatic tenderness. At 3.30 p.m. he was admitted to hospital. He complained that although he had a desire to micturate he could only pass a small quantity of highly coloured urine at a time. At 6 p.m. it was noted that since admission the patient had passed but one and a half drachms of urine, which on examination was found not to contain albumen. At 9.20 p.m. the patient felt more comfortable, the pains in head and back were better.

On August 4th the patient felt fairly well; he slept at intervals. There was no hepatic tenderness and the conjunctivæ were somewhat congested but not jaundiced. From 6 p.m. on August 3rd to 6 p.m. August 4th the patient passed twenty-three ounces of urine, the specific gravity of which was 1020. It was acid in reaction and contained no albumen. The blood was examined microscopically; no malaria parasites were found.

On August 5th at 10.55 a.m. he complained of nausea. At 1.55 p.m. he vomited a greenish bilious fluid. The skin was acting freely and he was not restless. During the day he slept at intervals. The bowels acted once. At 2 p.m. five and a half ounces of urine were passed; this contained a trace of albumen.

The total quantity of urine passed in the twenty-four hours was 32½ ozs.

On August 6th the skin was acting freely. The patient's bowels were opened five times during the day. The tongue was still coated. There was less nausea and no vomiting. He passed 34½ ozs. of urine during the twenty-four hours. There was still a trace of albumen in it. The blood was again examined; no malaria parasites were found.

On August 7th he was feeling better; his skin was moist, he had slept well, and the bowels had twice been opened. There was an erythematous blush on the skin of the back and chest.

The total quantity of urine passed during the twenty-four hours was 40 ozs. It was cloudy and contained a trace of albumen.

The patient had a good night, the bowels having acted once.

On August 8th the rash was more pronounced and rosy. It loooked like the rash of measles and extended to the abdomen, arms, and legs. It had not appeared on the face. The rash was accompanied by some pruritis. The quantity of urine passed in the twenty-four hours was 34 ozs. It was clear and did not contain albumen.

He slept well during the night and on the morning of August 9th the tongue was clean; the bowels were opened once. The quantity of urine passed in the twenty-four hours was 44 ozs.; it contained no albumen.

He slept well.

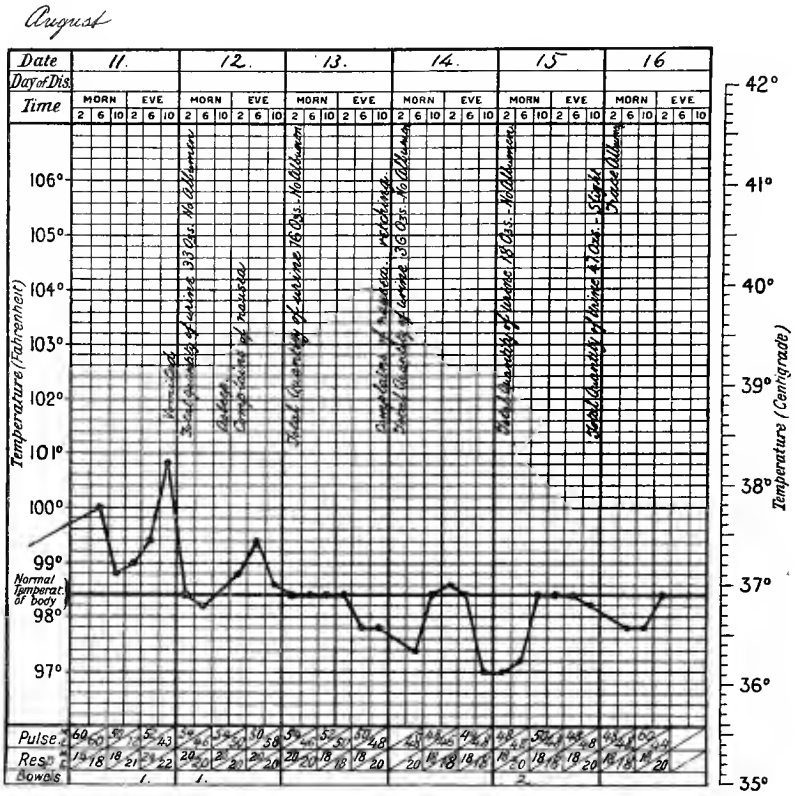
On the morning of August 10th the tongue was clean. The quantity of urine passed in the twenty-four hours was 54 ozs.; it contained no albumen.

On August 11th he was progressing towards convalescence and was removed to a Nursing Home.

CASE 18.

A Government Official, aged 27 years.

Previous History.—He had been in West Africa one year and three months; he had no previous tropical experience. No history of malarial fever was recorded. He had taken quinine regularly, and had not been out of Freetown for some time before the present illness.



History of Present Illness.—On August 11th the patient was admitted to hospital. There was slight abdominal tenderness, photophobia was noted, and the patient complained also of headache. There was no jaundice. The temperature was 101°, the pulse slow, 48 to 60 beats per minute.

On August 12th the temperature was 101°.

On August 13th the temperature was normal.

On August 16th the patient was transferred to the Nursing Home.

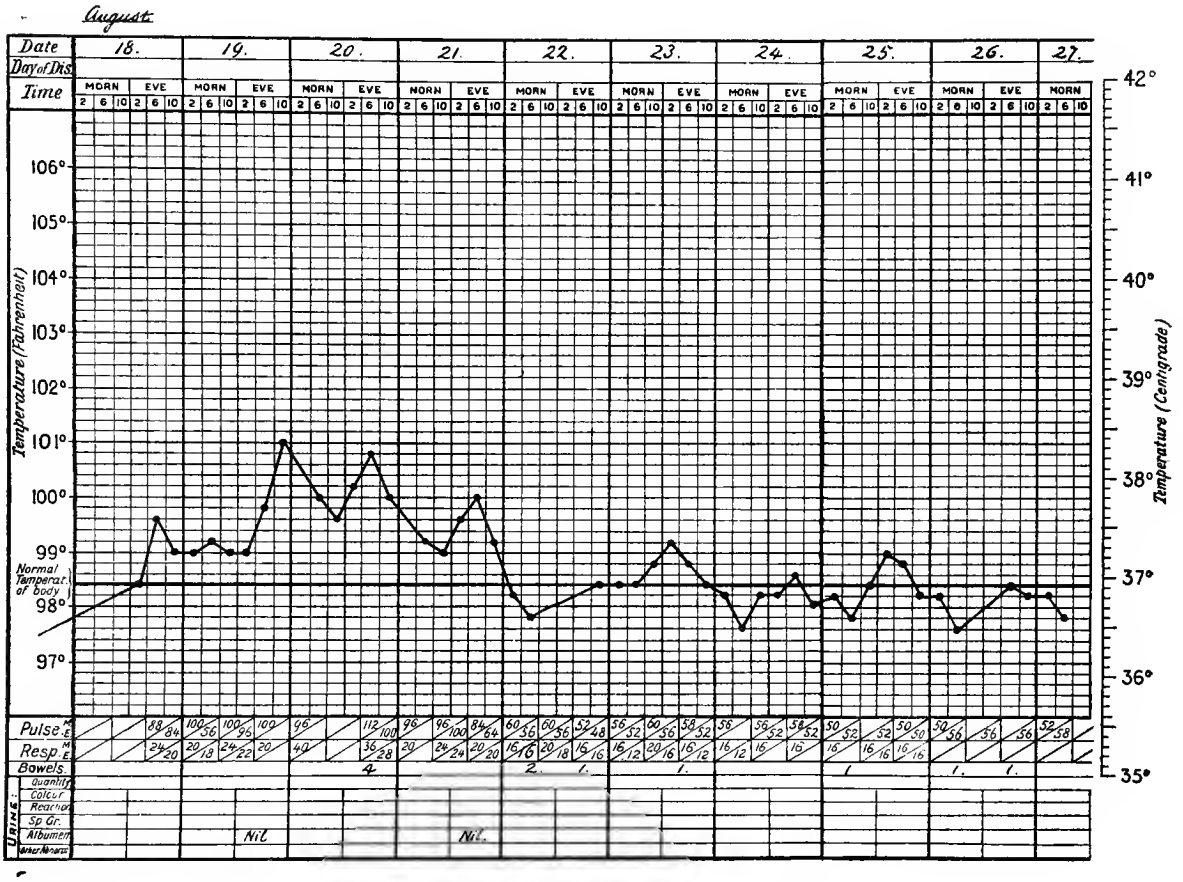
On August 20th the patient was convalescent.

CASE 19.

A Negro of the Mendi tribe living in Gloucester Street, aged 34 years.

He was employed as cook to the Nursing Home.

Previous History.—He was a native of Sierra Leone; his previous illnesses were not recorded; he had not been in the habit of taking quinine; he had not been out of Freetown for some time before the onset of the present illness.



History of Present Illness.—On August 18th there was a recent history of gonorrhœa for which the patient was in hospital. A week or two previously he noticed a rash which covered the whole of his body; a few days after the rash disappeared he began to suffer from pains in the joints, back, and abdomen. The pain was then most severe in the lateral thoracic regions. There was some jaundice. There was a sore on the penis as well as a urethral discharge. The urine was mixed with blood. He complained of acute pain in the left side of the chest, which, however, did not keep the patient awake.

On August 19th the patient passed five ounces of urine during the night, which did not contain albumen.

On August 20th the pain in the chest was better. The edge of the liver could be felt below the costal margin and there was some hepatic tenderness. There was still some jaundice. There was no vomiting; the tongue was covered with white fur.

On August 21st the pain in the left side was better; the breathing was easier; the conjunctivæ were still yellow; there was no albuminuria.

On August 23rd the patient was convalescing, his breath sounds were now normal at the base of the left lung. The conjunctivæ were still rather yellow.

On August 24th he was doing well. There was no loss of appetite. The temperature was 97·8°. The bowels were somewhat constipated.

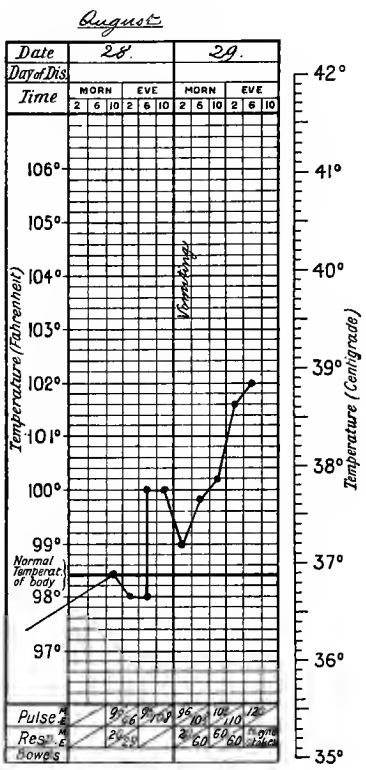
On August 25th he could take a deep breath without pain. The eyes were still rather yellow. He complained of hunger.

On August 27th the eyes were clear. There was no hepatic tenderness. The patient was discharged.

CASE 20.

A Negro Labourer of the Mendi tribe, aged about 26 years, living in Freetown (Kru-bay.)

Previous History.—He was a native of Sierra Leone. His previous illnesses had not been recorded. He had not been in the habit of taking quinine. He had not been out of Freetown for some time before the present illness.



History of Present Illness.—On August 28th, at 6.30 p.m., the patient was admitted to hospital. He was said to have been taken ill three days before with fever, headache, and pains all over his body. His skin was cold and his pulse weak. He was restless, tossing about so much that his temperature could not be taken; the pupils were dilated and did not react to light. He appeared stupefied, but could be roused. There was retention of urine and the bladder was distended. A soft catheter was passed and drew off ten ounces of urine.

On August 29th he had black vomit in the morning. His condition resembled that of the day before. He was very weak. The temperature was 97·8°, the pulse 96, respirations 20 to the minute. In the afternoon he again vomited. His skin was cold and clammy, that of the face was perspiring freely. His condition did not improve, his temperature rising to 101·8°. At 6.45 p.m. the patient died.

Post-mortem Examination.—There was considerable œdema of the left lung.

The stomach contained a large quantity of black fluid like that which was vomited, and there were punctate hæmorrhages into the mucous membrane of the stomach wall.

The small intestines also contained much black fluid like that in the stomach.

The liver was mottled.

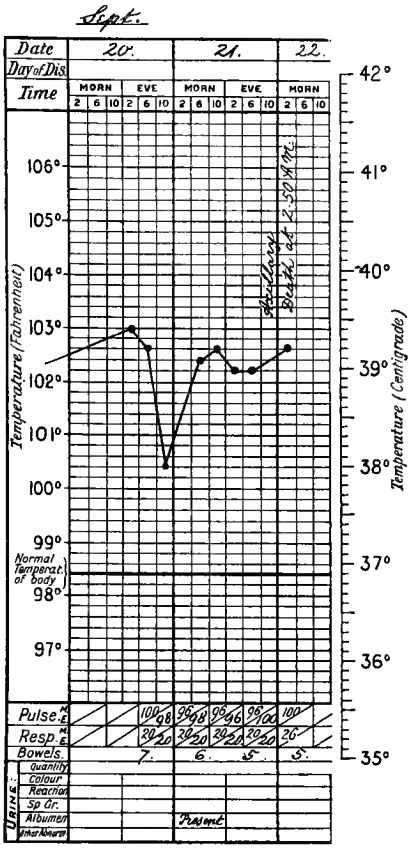
The kidneys were congested, there were hæmorrhages under the capsule.

The brain was congested, but there were no hæmorrhages into it.

CASE 21.

A European Clerk, aged 26 years.

Previous History.—The patient had been in West Africa for sixteen months; he had had no previous tropical experience. He had had previous attacks of malaria. He had taken quinine irregularly. He had not been out of Freetown for some time before the present illness. There was a recent history of C_2H_6O.



History of Present Illness.—He had not been feeling well since August 15th, but had endeavoured to continue at his work. On August 19th he sought medical advice at 5 p.m. His temperature was then 104·2°. The pulse rate 120. The tongue was coated. The skin was hot and dry. The bowels had been freely opened by a dose of Eno's fruit salt. The face was puffy and there was a contused wound of the lower lip. At 5.30 p.m. the temperature was 105°. He was inclined to be delirious (delirium tremens). There was no jaundice. He complained of slight pain in the liver. There was no pain in his epigastrium and no vomiting.

On August 20th, at 7 a.m., the patient's temperature was 104°, his pulse rate was 120. He had passed a restless night. At 1.45 p.m. the temperature was 103°; he was cold sponged at 2.5 p.m. and admitted to the Nursing Home. On admission he was very exhausted. He was very restless and delirious during the night, rambling at times, but he slept at intervals.

On August 21st urine was passed frequently in small quantities and was found to contain albumen. He had, however, suffered from albuminuria before his present illness. At 12 noon the blood was examined microsopically, one ring malaria parasite(?) was found. The respirations were short and catchy. The lungs, however, appeared to be normal. There was marked tenderness in the hypochondrium. The liver was enlarged and tender. There was slight jaundice especially marked in the conjunctivæ. At 5.30 p.m. the patient had black vomit. This was repeated at 7 p.m., when he was restless and the general condition was unchanged.

On August 22nd, at 2.50 a.m., he vomited a large quantity of "coffee-ground" material, and died.

Post-mortem Examination.—This was held at 7 a.m. and was limited to an examination of the abdomen. There was intense jaundice. There were areas of cyanosis all over the body.

The stomach contained "coffee-ground" fluid and the mucous membrane was markedly congested; there were petechial hæmorrhages at the cardiac end.

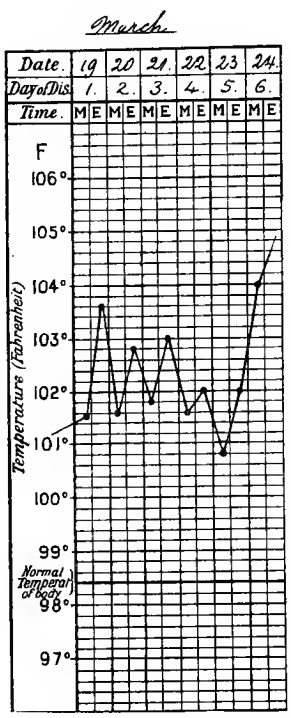
The liver was congested and showed signs of commencing cirrhosis.

The kidneys and spleen were congested.

CASE 22.

A Survey Officer, aged 29 years.

Previous History.—The patient was for nine months in West Africa in 1902, during which time he suffered from malaria, followed by attacks of malarial fever in England. He had taken quinine regularly, grs. v every day.



History of Present Illness.—He arrived in Sekondi from Accra on March 10th and slept at the Town Council offices.

On the morning of March 18th he sought medical advice. He gave a history of vomiting and diarrhœa during the whole of the previous night. There was a history of a similar illness at Accra before he came to Seccondee. He had no fever and the vomiting and diarrhœa were better. He was given mist. bismuthi and was ordered to rest. In the evening he was considerably better.

On the morning of March 19th he said he was well, but in the evening he complained of headache. The temperature was 101·6° and he was admitted to hospital.

On admission the temperature was 103·6°; diaphoretics were given.

On March 20th the temperature was 101°. There was considerable rigidity of the abdominal muscles, but no enlargement of liver or spleen could be detected on percussion. The heart and lungs were normal. The urine contained no albumen. Mist. quininæ 1 oz. (grs. x) was given.

At 6 a.m. on March 20th the temperature was 101·6°; he seemed fairly comfortable all day; the bowels were opened once, the motion not being abnormal. Quinine grs. x were given night and morning. At 9 p.m. the temperature was 102·8°.

On March 21st, at 6 a.m., the temperature was 101·8°. He was in a very apathetic and drowsy condition. There was no pain. On taking milk or Brand's essence there was some nausea. The tongue was very furred. The bowels were opened once. At 6 p.m. the temperature was 103°.

On March 22nd there was distinct gurgling in the right iliac fossa. At 6 a.m. the temperature was 101·6° and at 6 p.m. 102°.

On March 23rd the nausea and vomiting had increased. Mist. bismuthi containing small doses of morphia was given. It was difficult to make him take his food and the pulse was a little irregular in the evening.

On March 24th he was ordered a soap enema in the morning. He, however, refused to let it be given him. At 8.15 a.m. there was a very marked change in the patient. His conjunctivæ were stained deep yellow, and the whole of the rest of his body was stained a pale yellow colour. The heart was obviously failing. A mixture containing digitalin, strychnine, and caffeine was vomited. Digitalin and strychnine were given hypodermically.

There was marked nystagmus and twitching of the muscles of the legs and arms. The temperature was 104°. A full dose of quinine was given intramuscularly; he slowly became

unconscious and died, the temperature rising after death and the lemon colour of the body increasing very markedly.

Post-mortem Examination.—This was made sixteen hours after death.

The pericardium was normal. The heart: The muscle substance was pale and infiltrated with fat. The right chambers were considerably enlarged, and the walls were thin and friable. The valves were healthy, the mitral orifice admitting three fingers.

The lungs and pleuræ were healthy.

The liver was slightly enlarged, soft, and flabby. A nutmeg appearance on section was noted. The peritoneum stripped readily.

The pancreas was enlarged, its body being one and a half inch wide.

The spleen was enlarged and soft, and of a deep purplish colour on section. The stomach was normal.

The intestines: In the jejunum and ileum were scattered areas of congestion, with loss of substance in a few places. The appendix was healthy. The cæcum and ascending colon contained fæcal matter of a grey colour. The intestines contained no bile-stained fæces.

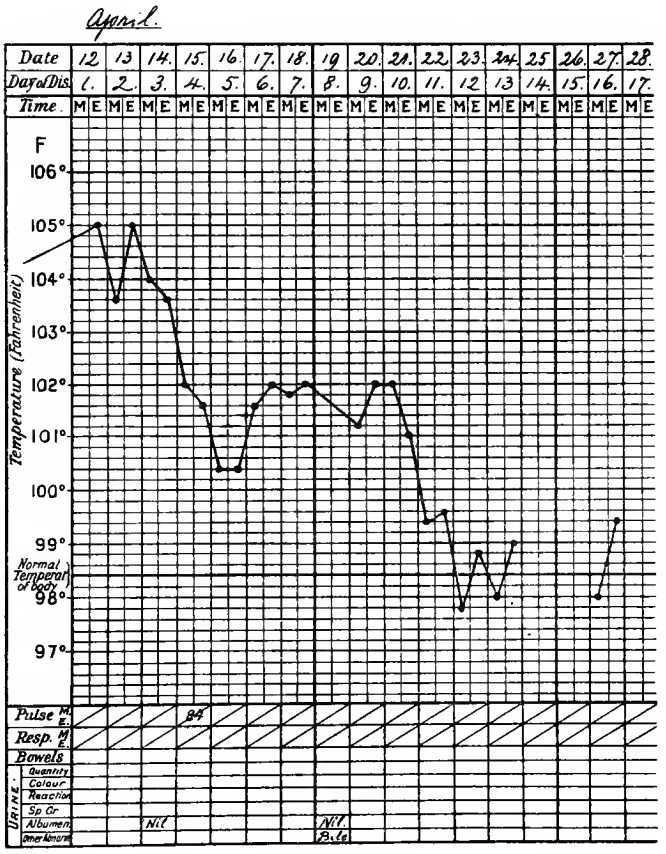
Their was no enlargement of the mesenteric glands.

The bladder contained some bile-stained urine.

CASE 23.

THE WIFE OF THE MANAGER OF A MERCANTILE FIRM, AND AGED ABOUT 30 YEARS.

Previous History.—She had for many years done tours of service on the Coast with her husband.



History of Present Illness.—On April 12th she was suddenly taken ill at night with severe headache, general prostration, and a temperature of 105°.

She first sought medical advice on April 13th. A dose of phenacetin was given with hot lime drinks, while ice-cold towels were applied to the head. Later in the morning, her temperature still being high, she was cold sponged and the temperature came down to 103·4°. The afternoon temperature was 105°. She was admitted to hospital. Phenacetin and hot lime drinks were again given, but had little effect. An intramuscular injection of quinine gr. v and a draught containing trional were given. She had little sleep and was very restless all night.

On April 14th, at 6 a.m., the temperature was 104°. The bowels were confined. Calomel gr. I was ordered every hour until three grains had been taken. Three good motions resulted. At 8 a.m. an intramuscular injection of quinine grs. IX was given. At 8 p.m. an

intramuscular injection of quinine grs. IX was given. At 6 p.m. the temperature was 103·8°. The urine contained no albumen. A sleeping draught containing a bromide and chloral was given and she had a better night.

On April 15th, at 6 a.m., the temperature was 102°. At 9 a.m.an intramuscular injection of quinine grs. IX was given. The headache was not so bad, but she was still very restless. The tongue was furred and she complained of nausea. There was no vomiting. Pulse: 84 beats to the minute, full and hard. At 6 p.m. the temperature was 101·6°. During the night the patient vomited after all food. A bismuth mixture was given, but was vomited and the patient was then put on liq. hydrarg. perchl. m. XX every two hours.

On April 16th, at 6 a.m., the temperature was 100·4°. There was some jaundice. Stimulants were given as required. At 6 p.m. the temperature was 100·4°. The patient had a better night.

On April 17th, at 6 a.m., the temperature was 101·6°. The jaundice was more pronounced, the conjunctivæ were very yellow. There was no albuminuria. Vomiting was not so troublesome and was controlled by sucking small pieces of ice. The vomited matter was greenish undigested milk. She was taking Benger's food, Brand's essence, barley and milk. She was given an intramuscular injection quinine grs. IX. At 6 p.m. the temperature was 102°.

On April 18th, at 6 a.m., the temperature was 101·8°. She slept better. She was very deaf. Vomiting was not so frequent, but the vomit contained little black specks. The jaundice was deeper. The bowels were opened, the motions being of a yellow clay colour. She did not now complain of headache, but only of a bad taste in her mouth. At 6 p.m. the temperature was 102°. The patient slept better.

On April 19th she was very deaf. The pulse was weaker and not so full. There was no albuminuria, but the urine contained bile. Stimulants were pushed. A draught containing bromide was given at night. The patient slept better.

On April 20th, at 6 a.m., the temperature was 101·2°. Her pulse was better. The conjunctivæ were a deep yellow. The whole body was jaundiced. The bowels were confined. A mixture containing sodium sulphate was given. At 6 p.m. the temperature was 102°.

On April 21st, at 6 a.m., the temperature was 102°. She felt better. The vomiting had almost stopped and she now slept fairly well. At 6 p.m. the temperature was 101°.

On April 22nd, at 6 a.m., the temperature was 99·4°; she was taking more food and seemed much more comfortable. The bowels were well opened, the motions not so white. At 6 p.m. the temperature was 99·6°.

On April 23rd, at 6 a.m., the temperature was 97·8° and at 6 p.m. temperature 98·8°.

On April 24th, at 6 a.m., the temperature was 98°, the bowels were opened four times; at 6 p.m. the temperature was 99°.

On April 26th she was taking solid food and was allowed up for two hours.

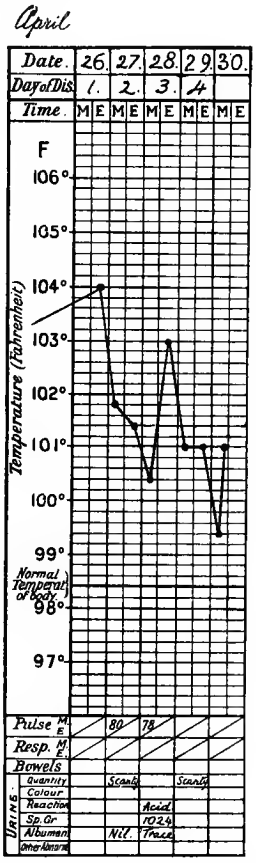
On April 27th, at 6 a.m, the temperature was 98° and at 6 p.m. 99·4°.

On April 28th the patient sailed for England. The jaundice was still very marked, but was clearing up.

CASE 24.

THE MANAGER OF A MERCANTILE FIRM, AGED 42 YEARS. THE HUSBAND OF THE PREVIOUS CASE.

Previous History.—He had been for many years in various parts of the tropics. The last ten to fifteen years had been spent in West Africa, with intervals for leave. His habits as regards quinine prophylaxis were not known. He had been for fifteen months in Seccondee when attacked.



History of Present Illness.—He was taken suddenly ill on the night of April 26th with severe frontal headache, vomiting, and a temperature of 104°.

On April 27th, at 6 a.m., he first sought medical advice. His temperature was then 101·8°. There was a history of exposure to the sun in an open boat a few days before, and he said that he had not felt well since. His eyes were bloodshot, painful, and there was considerable photophobia. The tongue was furred, the edges and tip were clean. The pulse rate was 80 to the minute, full and hard. He was given phenacetin and hot lime drinks, and an ice bag was applied to the head. At 6 p.m. the temperature was 101·4°. A sleeping draught of bromide and calomel grs. v was given.

On April 28th, at 6 a.m. the temperature was 100·4°. He was given mist. quinine 1 oz. (grs. x) and a saline aperient mixture. The headache was marked and persistent. He vomited at intervals, the vomit only consisting of a little milk and mucous. The urine was scanty, but did not contain albumen. Pulse rate 80 to the minute, not quite so hard and full. At 6 p.m. the temperature was 102·8°. Mist. quinine 1 oz. (grs. x) was given. He had a fair night's rest.

On April 29th, at 6 a.m., the temperature was 101°. He was restless and still complained of headache. Pil. hydrarj. grs. II and pil. cal. c. hyosc. grs. VIII were given and the bowels were opened. An intramuscular injection of quinine bihydrochloride grs. IX was given, but had no effect on the temperature. The vomiting was troublesome all day. The vomited matter contained black specks. The urine contained a trace of albumen. The motions were of a pale clay colour. The pulse was not so good, 78. He was restless and uncomfortable. Pot. brom. grs. xxx were given at 6 p.m.; temperature 101°.

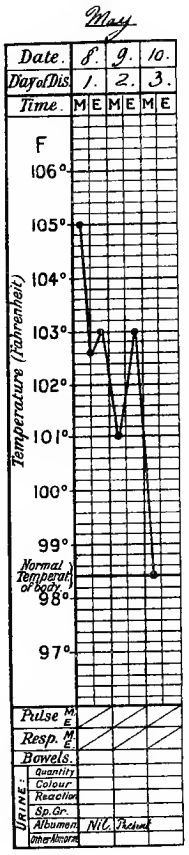
On April 30th, in the early morning, he was able to attend to a small business matter and to sign his name to a letter. Very little urine was passed during the last sixteen hours. At 10.30 a.m. he had a convulsion and, in spite of hypodermic injections of stimulants, sank and died.

Jaundice was very much more marked after death, the body being of a dark brown colour.

CASE 25.

A Government Official, aged 26 years.

Previous History.—He had been in West Africa five months and had no previous tropical experience. His habits as regards quinine prophylaxis were not known.



History of Present Illness.—On May 8th, early in the morning, he visited his next door neighbour living in the other half of the same bungalow and told him that he felt very ill. His temperature was then 105° and he complained of severe headache and photophobia. He was first seen by a doctor at 8 a.m., when he complained of intense headache ; his face was very flushed and the eyes were injected and watery. There was a general feeling of prostration. The tongue was furred. He was removed to hospital. On admission the temperature was 102·8°. There was no albuminuria ; the pulse was very hard. The patient was given phenacetin and hot lime drinks without much effect. At 6 p.m. the temperature was 103°. At 8.30 p.m. calomel grs. III was given.

The patient had a fair night, disturbed by the effects of the calomel.

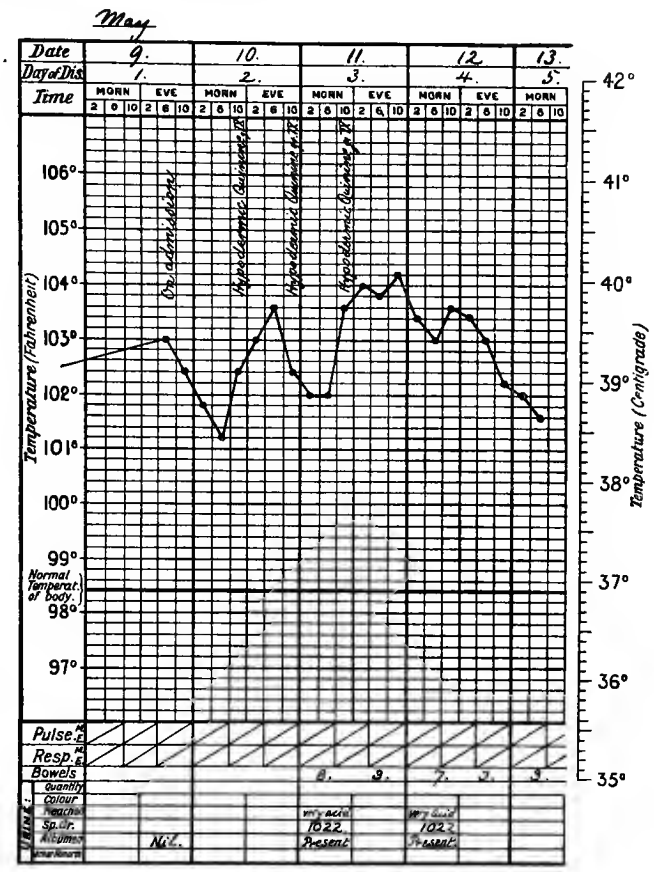
At 6 a.m. on May 9th the temperature was 101°. A small quantity of urine (not more than half an ounce) was passed at this time and the specimen contained albumen. At 7 a.m. he took large quantities of milk and soda, of which a little was vomited. At 9 a.m. an intramuscular injection of quinine grs. IX was given. At 3.30 p.m. the patient again passed urine for the last time. The bowels were freely opened, but no urine was passed. Hot packs were applied to the patient's loins, and he was put on Sternberg's mixture. At 6 p.m. the temperature was 103°. At 9 p.m. an intramuscular injection of quinine grs. IX was given. During the night he was given stimulants, brandy and champagne, as his pulse was weak.

On May 10th, at 6 a.m., the temperature was 98·4.° The pulse rate was 72 to the minute. Hiccough began to trouble and exhaust him very much. Ice was given and a hot-water bottle was applied to the abdomen. Doses of spt. chloroformi checked the hiccoughing to some extent. A mixture containing digitalin and strychnine was vomited. Vomiting occurred at intervals, the vomit containing black specks. At 2 p.m. there was twitching of the muscles of the mouth and hands and the jaundice had deepened, the conjunctivæ being of a deep yellow colour. The muscular convulsions gradually grew stronger until 11 p.m., when the patient vomited a large quantity of black matter and died.

CASE 26.

A Missionary, aged about 25 years.

Previous History.—He had been one year in West Africa, of which the last two months had been spent in Seccondee. A few days previously he sought medical advice for an attack of urticaria which rapidly cleared up.



History of Present Illness.—On the morning of May 9th the patient complained of headache and feeling unwell. His temperature was normal. In the afternoon his temperature rose to 103° and he was admitted to hospital. At 6 p.m. the temperature was 103°. The eyes were rather injected, watery, and bright. Pulse 90, full and hard. Phenacetin and hot drinks produced profuse sweating. He complained of headache and a feeling of great prostration. He passed a fair night and took his milk and soda well.

On May 10th the bowels were confined, the headache was rather worse, and jaundice was beginning to be noticeable. At 9 a.m. an intramuscular injection of quinine grs. ix was given. Calomel, grs. v, was also given by the mouth. An ice bag was applied to the head.

On May 11th, at 9 a.m., an intramuscular injection of quinine grs. ix was given without effect on the temperature. He was put on Sternberg's mixture. The pulse rate was 80 beats to the minute, and was not so full and hard. Albumen now appeared in the urine for the first time. He seemed fairly comfortable all day; he had taken nourishment and stimulants well; he had not complained so much of headache and had been able to read. The jaundice was deeper. The bowels were opened after the calomel, the motions being rather pale. Towards night the patient became restless and a little delirious. He was given pot. brom. grs. xxx which seemed to soothe him. The patient did not sleep very much. He vomited a little and there were black specks in the vomit.

On May 12th, at 6 a.m., the temperature was 103°. The bowels were freely open. The urine contained a considerable quantity of albumen, was very acid, and its specific gravity was 1022. The pulse, 80 beats to the minute, was not so full. At 6 p.m. the temperature was 103°. He was only semi-conscious. The pulse gradually failed in spite of the exhibition of stimulants. At about midnight he brought up quantities of black vomit without effort.

On May 14th, at 4 a.m., the patient died.

A Post-mortem Examination was made about twelve hours after death. The body was well nourished and was stained a pale yellow colour all over. There were well marked petechiæ about the neck and shoulders. Rigor mortis was still present and the body was still warm. The conjunctivæ were stained a deep saffron yellow colour.

The heart and lungs were normal. There was some staining of the cardiac valves.

The liver was slightly enlarged, pale yellow on section, congested, and shewed considerable fatty degeneration.

The kidneys: There were hæmorrhages, more marked at the bases of the pyramids, beneath the capsules, which stripped readily. There were no hæmorrhages into the renal pelvis.

The spleen was a little swollen. There was no marked macroscopic change.

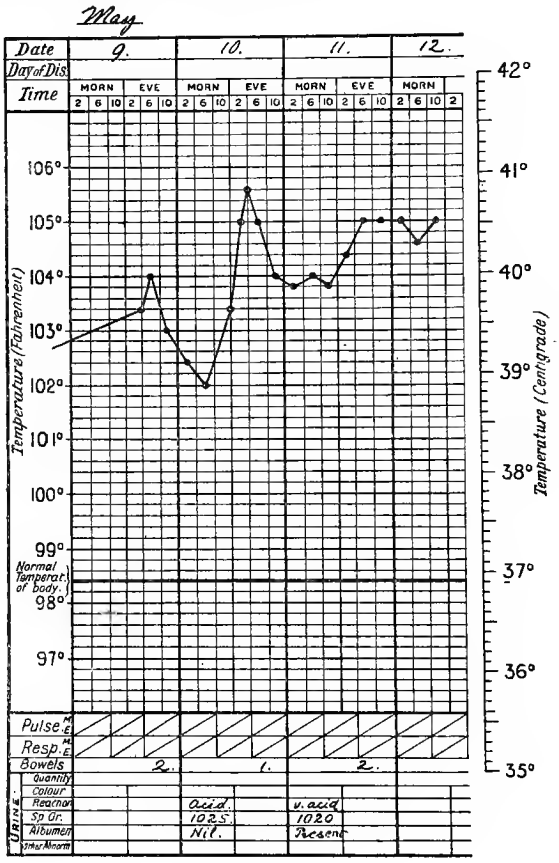
The stomach contained black fluid and there was marked congestion of the mucous membrane.

The intestines: The lower part of the small intestines contained black tarry matter. There were some sub-peritoneal hæmorrhages.

CASE 27.

A European Contractor, aged about 45 years.

Previous History.—He had been living in Seccondee for twelve days. The length of his West African experience, his previous tropical experience, his habits as regards quinine prophylaxis, and his previous illnesses were not known.



History of Present Illness.—He had been living in Commercial Town in a house overlooking the market-place. He first sought medical advice on the afternoon of May 9th, when he complained very much of headache and pain in the limbs. The temperature was 104°. He was at once removed to hospital. On admission the face was flushed, the eyes injected and bright, the tongue was furred and red at the edges. The pulse was 84 beats to the minute, and it was very full and hard. At 6 p.m. the temperature was 104°. He was given phenacetin and a hot lime drink. An ice bag was applied to the head. The patient sweated freely. The patient passed a fair night. He was given milk and soda-water during the night.

On May 10th, at 6 a.m., the temperature was 102°; the pulse 72 beats to the minute, not so full. At 9 a.m. the patient was given an intramuscular injection of quinine bihydrochloride. There was no albuminuria. In the afternoon the temperature rose to 104°. Tepid to cold spongings were applied without much effect on the temperature. During the day the patient was fed on chicken broth and milk. At 6 p.m. the temperature was 105° and at 9 p.m. quinine bihydrochloride was injected intramuscularly. There was a little vomiting during the night, the vomit containing "black specks."

On May 11th, at 6 a.m., the temperature was 104°. Nausea was not very marked, but there was some retching. The urine contained albumen. He was put on Sternberg's mixture. Later there was considerable delirium, the patient shouting and trying to get out of bed. At 6 p.m. the temperature was 105°. The patient had a very restless night; he was constantly in and out of bed, talking and shouting; he refused all food.

On May 12th, at 6 a.m., the temperature was 105°. Albuminuria was more marked. He was vomiting constantly "black vomit." Very marked convulsions set in about five hours before death, which was due to heart failure. The patient passed no urine during the eighteen hours before his death, but the bowels were opened, the stools being of a yellowish white colour.

CASE 28.

A Hausa Negro who is said to have died suddenly during the night.

Previous History.—None obtainable.

History of Present Illness.—None obtainable.

Post-mortem Examination.—The body was that of a tall muscular man. Rigor mortis was passing off. The conjunctivæ were of a deep yellow colour. Some "black vomit" had escaped from the mouth on to the table.

The heart was slightly dilated, otherwise healthy; the valves were deeply stained.

The lungs were congested at the bases, but crepitant. There were adhesions at the right base and about the upper portion of the lower right lobe.

The liver was a little enlarged, yellow on section. The tissue appeared to be softer than normal, fatty degeneration was thought to be present.

The spleen was enlarged and its capsule thickened; it was tough on section.

The kidneys: The capsules stripped readily. There were small hæmorrhages into the cortex which were not very marked as seen through the capsules.

The stomach contained "black vomit."

The intestines: The lower part of the small intestine contained black tarry mucous matter. All the tissues were stained a deep yellow.

CASE 29.

A Negro (Kroo) working for the Gold Coast Machinery and Trading Company.

He was brought to the Mortuary dead on May 16th.

Previous History.—None obtainable.

History of Last Illness.—None obtainable.

A Post-mortem Examination was held about twelve hours after death.

The body was that of a well-nourished muscular man. The conjunctivæ were stained a deep yellow colour. All the tissues were of a deep saffron tint.

The heart was normal, the valves shewed the staining already mentioned.

The lungs shewed old adhesions on both sides, but were crepitant throughout.

The liver was slightly enlarged, of a pale yellow colour, very suggestive of fatty degeneration.

The kidneys: There were hæmorrhages in the cortex, chiefly at the pyramidal bases.

The spleen was enlarged; the capsule, very thick and tough, was adherent to the abdominal wall.

The stomach contained dark, almost black, fluid, and its mucous membrane was markedly congested.

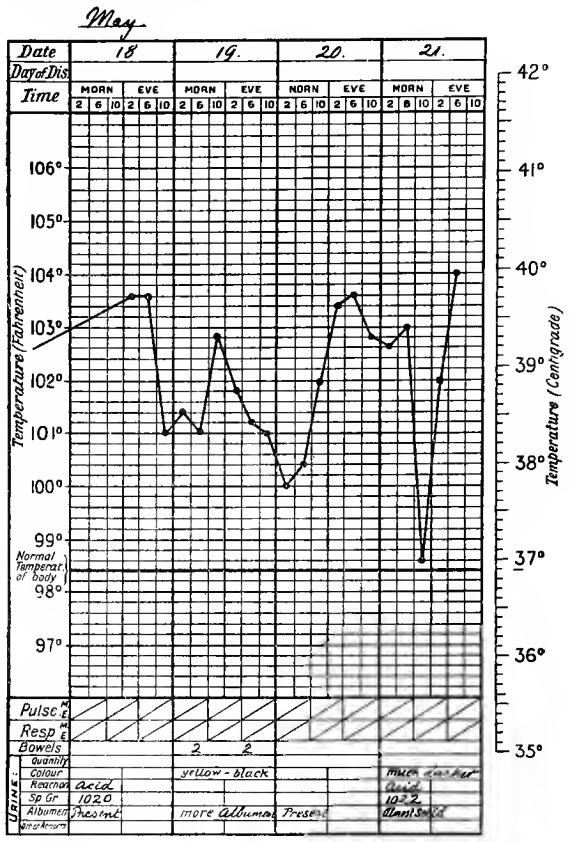
The intestines: The lower part of the small intestines contained black tarry matter. There were small red hæmorrhagic patches underneath the peritoneum.

The congestion of the mucous membrane was not so marked as in the stomach.

CASE 30.

A Building Contractor, aged about 35 years.

Previous History.—He had been living in Seccondee for some months. His West African experiences, his previous tropical experience, his habits as regards quinine prophylaxis, and his previous illnesses were not known. He had been living in Commercial Town, Seccondee, when that part of the town was evacuated, and he was allowed to sleep in hospital on May 17th. At this time he was under treatment.



History of Present Illness.—On May 18th, in the morning, he had a high temperature, but persisted in his determination to go to work. At 2 p.m. he returned obviously very ill, and was at once admitted to hospital. His temperature was then 103·8°. The face was flushed; the eyes markedly injected, bright and watery; the tongue was furred and red at the tip; the pulse, 90 beats to the minute, was full and hard. The patient was given phenacetin and a hot lime drink, which resulted in profuse diaphoresis. At 8 p.m. the temperature was 101°. Mist. quinine oz. i (gr. x) was given. The patient was very restless during the night; he did not sleep much.

On May 19th, at 6 a.m., the temperature was 101°. The urine passed during the night contained albumen. The eyes were slightly jaundiced. The pulse rate 70, softer and not so full. A mixture containing digitalis, strychnine, and ammonia was given. There was some nausea. He vomited a great deal of milk; no sign of "coffee-grounds."

After sucking ice he was able to retain the Brand's essence and chicken broth given him from time to time. He was very restless and talkative all day, and became more jaundiced. He was constantly trying to get out of bed. At 6 p.m. the temperature was 101°.

On May 20th, at 6 a.m., the temperature was 102°. The pulse, 70 beats to the minute, was better. He was put on Sternberg's mixture. He was very restless and excited all day, but slept at intervals. Nausea was more pronounced. There were "black specks" in the vomit. He refused to take milk, but took soup and meat juice in small quantities. At 6 p.m. the temperature was 101°. The patient was very restless and delirious all night; he refused all food; he vomited at intervals, the "black specks" in the vomit being more pronounced; the urine, of which only about five ounces were passed during the night, was almost solid with albumen.

On May 21st, at 6 a.m., the temperature was 103°. He was very delirious and excited all day, tearing up the mosquito net and blankets. At the end he vomited large quantities of "black vomit." Jaundice gradually deepened. He had a convulsion at the end. No urine was passed during the last twenty-four hours of life. At 5.30 p.m. death occurred, the temperature being 104° at that time.

A Post-mortem Examination was held on May 23rd, about twelve hours after death.

The body, not well nourished, thin and spare, was stained a deep yellow colour ; there were petechiæ about the neck and upper part of the trunk.

The heart was healthy, but the valves were stained.

The lungs were normal.

The liver was slightly enlarged, pale yellow, and tougher than normal on section. Fatty degeneration was present.

The kidneys : There were small hæmorrhages into the cortex, chiefly at the pyramidal bases. The capsules stripped readily.

The spleen was enlarged and soft.

The small intestine contained a small quantity of black tarry material.

CASE 31.

An Accountant for one of the Trading Firms, aged about 33 years.

Previous History.—He had been about three years in West Africa, of which time the last seven months were spent in Seccondee. He had had no previous tropical experience. He had taken quinine regularly.



History of Present Illness.—During the night of May 19th he was taken suddenly ill ; he vomited and his temperature rose to 105°.

In the morning of May 20th he was first seen by the doctor. His temperature was then 102°, the face was flushed, the eyes injected, and the tongue furred. He was given phenacetin and hot drinks, this treatment resulting in a profuse diaphoresis. Quinine grs. x was now given and also again at night. At 6 p.m. the temperature was 100·6°.

On May 21st he complained of severe headache aud was vomiting bilious matter. He was admitted to hospital. On admission the temperature was 101° ; the pulse was full and hard, and the skin moist. Beyond the headache there was no further complaint of illness. Sternberg's mixture was ordered. At 6 p.m. the temperature was 101°. An intramuscular injection of quinine grs. ix was given, which did not, however, have any effect on the temperature. The urine was acid ; its specific gravity was 1022 and it did not contain albumen.

On May 22nd, at 6 a.m., the temperature was 101·2°. He seemed more comfortable and said he had had a good night. The bowels had been opened and the motions were of normal colour. He had taken plenty of nourishment. The jaundice, which was but slight, became deeper. The conjunctivæ were very much injected and a rash like measles appeared on the face, the upper part of the trunk, and the backs of the hands. The bowels were twice opened during the day. Only twelve ounces of urine were passed in the last twelve hours. There was no albuminuria. The pulse was the same as on the previous day. The liver was slightly enlarged and tender. The spleen was not palpable; the patient was, however, very stout. At 6 p.m. the temperature was 102°. The patient slept at intervals during the night.

On May 23rd, at 6 a.m., the temperature was 102·4°. The pulse was not so good. Brandy and champagne were given as required. Jaundice was much more pronounced. The conjunctivæ were now a deep saffron yellow colour. The eyes looked swollen and watery. There was albuminuria. He was removed to the isolation hospital. The patient was more lethargic this day; he tried to smoke, but was less inclined to talk, and there was some nausea and vomiting. The vomit was of a reddish colour like the dregs of beef tea, it contained no "black specks." At 6 p.m. the temperature was 102°. The patient passed a fair night.

On May 24th, at 6 a.m., the temperature was 102°. The bowels were opened, but the patient was not passing much urine. The jaundice was very deep; the rash fading; the tongue was fairly clean; the skin moist; the pulse 70, soft. The patient was taking nourishment well, with stimulants in small quantities. There was some little vomiting, the vomit now containing "black specks." There was also more mucous in the vomit than before. The urine was highly albuminous. At 6 p.m. the temperature was 103·4°. The patient slept fairly well.

On May 25th, 6 a.m., temperature 101°. He was more lethargic. Later in the day he became restless; he could not stay lying down in bed, but kept on getting up and sitting on the edge of his bed. He complained of a dull aching in his head. Very little urine was being passed. Saline enemata were ordered to be given every four hours. At 6 p.m. the temperature was 101°. He slept well in the night. At midnight the pulse began to fail. Digitalis and strychnine were given hypodermically.

On May 26th, at 6 a.m., the temperature was 99·4°. The urine was very albuminous. The vomiting was not frequent, but the vomit was chocolate coloured. The pulse 80, fairly full and soft. During the greater part of the day the patient lay in bed, apparently asleep, bathed in a profuse perspiration. The measles-like rash had now quite gone, but petechiæ appeared about the neck and trunk and on the hands. The jaundice was very deep. Hiccough now became troublesome. At 6 p.m. the temperature was 98·8°.

On May 27th, at 6 a.m., the temperature was 98·8°. There was some twitching about the angle of the mouth and in the hands. He was semi-conscious until the afternoon, when the muscular twitchings became more pronounced. The pulse began to fail. No urine was passed after 5 a.m. The patient took little nourishment all day. The rectal injections were continued throughout the day. At 10.45 p.m. the patient died quite quietly.

Post-mortem Examination.—The body was still warm. Rigor mortis was well marked. The whole of the abdomen and extremities were a saffron tint, the conjunctivæ were a deep yellow colour. The face and neck were deeply cyanosed, and there were petechiæ about the upper part of the trunk and on the hands.

The heart: There was some fatty degeneration of the muscle tissue, and there was a considerable amount of fatty tissue on the external surfaces. The valves were deeply stained, otherwise normal.

The lungs were congested at their bases, but crepitant throughout.

The stomach contained black grumous fluid. The mucous membrane was deeply congested, and there were evidences of hæmorrhage from it.

The small intestines contained similar hæmorrhagic matter, and were markedly congested; this condition obtained chiefly in the ileum.

The bladder contained about eight ounces of bile-stained urine.

The spleen was slightly enlarged and congested.

The kidneys: There were sub-capsular hæmorrhages around the pyramidal bases and the capsule stripped readily.

The pancreas was deeply stained.

The liver was slightly enlarged, especially the left lobe, and of a deep yellow colour. On section "nutmeg" in appearance. There were well marked hæmorrhages in the tissues covering the gall bladder, but not into its mucous membrane. The gall bladder contained about 1½ ounce of deep green gall.

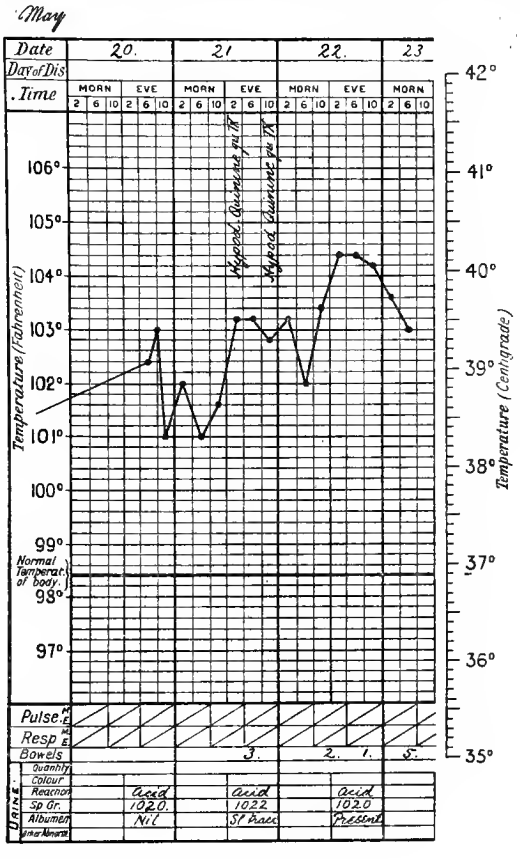
The whole of the abdominal and thoracic viscera appeared to assume a deeper tint on exposure to the air. The blood was of a darker colour than normal.

CASE 32.

A Missionary, aged 50 years.

Previous History.—He had been in West Africa for thirty years, including intervals of leave. He had no other tropical experience. He had had Blackwater Fever several times. His habits as regards quinine prophylaxis were not known,

On May 12th he arrived in Seccondee from Accra and visited Case 26 in hospital.



History of Present Illness.—On May 20th, at 5 p.m., he was brought to hospital in a hammock in a semi-conscious condition. The temperature then was 103°. There was no complaint of headache, but only of a general feeling of weakness and discomfort. He was given phenacetin grs. v and hot lime drinks; this treatment resulted in a profuse diaphoresis, the temperature falling to 101°. Late in the evening he said he felt better. There was no albuminuria; the pulse, 80 beats to the minute, was hard. During the night the patient took a good deal of milk, barley water, Brand's essence, and arrowroot.

On May 21st, at 6 a.m., the temperature was 101°; an intramuscular injection of quinine grs. iv was given at twelve-hourly intervals without effect on the temperature. There was now a faint trace of albumen in the urine. The bowels were confined. Calomel grs. v was given, followed by a dose of Abbey's salts. Three good motions of a normal colour resulted. Some jaundice now appeared. He was quite cheerful and comfortable during the day, but complained that the light hurt his eyes. At 6 p.m. the temperature was 103·2°. The pulse 76 beats to the minute.

Early in the night the patient began to complain of headache and was a little deaf; an ice bag was applied to the head.

On May 22nd, at 6 a.m., the temperature was 102°. The urine contained more albumen, its specific gravity was 1022; it was very acid and shewed a large cloud of mucus. He was put on Sternberg's mixture. He still took a good deal of nourishment, as well as brandy and champagne. Late in the afternoon mental symptoms developed; there was some forgetfulness and incoherency, but he was able to write letters. The bowels were opened three times during the day, the stools being paler in colour; only twelve ounces of urine were passed during the twenty-four hours. At 6 p.m. the temperature was 104·4°.

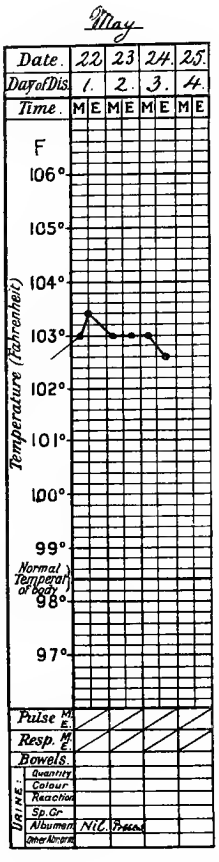
He slept fairly well. The bowels were opened during the night, but very little urine was passed.

On May 23rd the temperature at 6 a.m. was 102°. The pulse, 72 beats to the minute, was now weaker. There was a little vomiting of blackish fluid. Jaundice was more pronounced. The conjunctivæ were of a deep yellow colour. At 10.30 a.m. the patient died of heart failure, in spite of the exhibition of stimulants.

CASE 33.

A Government Official, aged 32 years.

Previous History.—He had completed one tour in West Africa after which he was anæmic and had an enlarged spleen; he returned to the Colony at the end of October. He had previous tropical experience in the Orange River Colony in 1901. His habits as regards quinine prophylaxis were not known.



History of Present Illness.—On May 22nd, early in the morning, he was awakened by severe frontal headache, pain in the eyes, and photophobia; the temperature was then 103°. He was first seen by a medical man at 6.30 a.m., and was immediately removed to hospital. On admission his temperature was 103·4°. The pulse full and hard. There was no albuminuria. An ice bag was applied to the head. At bedtime a sleeping draught of bromide was given. The patient was very restless all night, but dozed at intervals.

On May 23rd, at 6 a.m., the temperature was 103°. The pulse 90 and full. Headache still persisted. At 10 a.m. an intramuscular injection of quinine bihydrochloride grs. IX was given. Calomel grs. VI, followed by Abbey's salts, was also given. The bowels acted six times, the stools being of a light clay colour. There was slight nausea, no actual vomiting. There was also some jaundice. At 6 p.m. the temperature was 103°. At 9 p.m. an intramuscular injection of quinine bihydrochloride grs. IX was given.

The patient was slightly delirious during the night, but slept at intervals. No urine was passed during the night.

On May 24th, at 6 a.m., the temperature was 103°. After a cup of tea at 6 a.m. he vomited, the vomit containing "black specks" and mucus. He was removed to the isolation hospital and put on Sternberg's mixture. The pulse was now irregular and not so strong. A mixture containing tinct. digitalis and liq. strychninæ hydrochlor. was given every four hours. Stimulants were given as required. He was now taking a fair quantity of chicken broth, milk, arrowroot, and barley water. At 6 p.m. the temperature was 102·6°. Jaundice more pronounced. No urine was passed during the night.

On May 25th he vomited black and mucous material. The bowels were open, the stools being loose and of a light clay colour. At 7 a.m. the heart failed rapidly. There were no convulsions before death.

CASE 34.

A Negress, the Wife of a Native Clerk, who died in her home at Essikadu, near Seccondee.

Previous History: Not obtainable.

History of Present Illness: Not obtainable.

The Post-mortem Examination was held about sixteen hours after death.

The body was that of a well-nourished healthy woman.

The conjunctivæ were stained a deep yellow.

The lungs and heart were normal.

The liver was slightly enlarged, yellow on section, and fatty degeneration was present. It appeared to be bloodless.

The stomach contained a small quantity of black fluid and the mucous membrane was congested.

The small intestines contained blackish mucous material for a considerable length.

The spleen a little enlarged, was otherwise normal—perhaps a little tough on section.

The uterus was very considerably enlarged.

The ovaries: There were very definite hæmorrhages in both ovaries.

The fallopian tubes were very much enlarged and swollen, the fimbriated extremities being much congested.

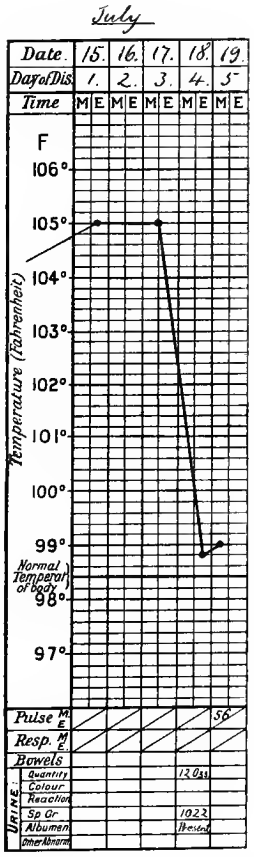
All the tissues were stained a deep yellow.

CASE 35.

A European Clerk at Saw-mill Camp, aged 38 years.

Previous History.—The patient was originally a sailor by occupation. His length of service in West Africa was not known. He was said to have served in the Ashanti expedition under Sir James Willcocks. He had been in the habit of taking quinine grs. xv per week in three doses. His previous illnesses and tropical experience were not known.

He first went to Saw-mill Camp on June 22nd, 1910, and had not left it since.



History of Present Illness.—He was taken suddenly ill with fever and headache on July 15th, his temperature being 105°.

On July 16th the temperature was still high, and there were bilious vomiting and hiccough.

He did not sleep at night, and on the morning of July 17th his condition was unaltered, the temperature then being 105°, and the vomiting persistent.

On July 18th the patient first received medical advice. It was decided to remove him to hospital. After he was put into the train he vomited "black vomit." On arrival at hospital he was somewhat collapsed. The temperature was 98°; the pulse 60. At 12 noon he vomited a little black "coffee-ground" material; there was persistent hiccough, and a considerable amount of "black vomit" was brought up every half hour. He was jaundiced all over; the conjunctivæ were of a light orange colour. No urine was passed up to 3 p.m. Treatment by Sternberg's mixture was ordered, a mustard plaster was applied to the abdomen, and half an ounce of the following mixture given every third hour :—

℞ Tinct. Strophanthi	...	...	...	mm. LXXX.
,, Nucis Vomicæ	...	...	...	mm. LXXX.
Cocainæ Hydrochlor.	...	...	...	gr. IV.
Aq. Chloroformi ad	...	...	...	oz. VIII.

At 4 p.m. he passed twelve ounces of clear albuminous urine, the specific gravity of which was 1022.

At 9 p.m. the temperature was 98·8°; the vomiting and hiccough still continued.

He vomited all night and hiccough was continuous; he only slept for about half an hour.

At 6 a.m. on July 19th the temperature was 99°; the pulse slow, 56. He was given barley water and iced water from time to time. At 9 a.m. there was some delirium. At 10 a.m. he was unconscious and continued to hiccough and bring up "black vomit." At 6 p.m. he died.

Post-mortem Examination.—The body was distinctly yellow, especially about the back and shoulders. There was a patch of ecchymosis on the scrotum. The face was jaundiced and of a deep yellow colour.

The stomach contained black material; the mucous membrane was congested and ecchymosed in patches.

The small intestine was in a similar condition.

The liver was enlarged, of a yellow bath-brick colour, and mottled on section, the lighter areas being at the periphery of the lobules probably fatty degeneration (? nutmeg).

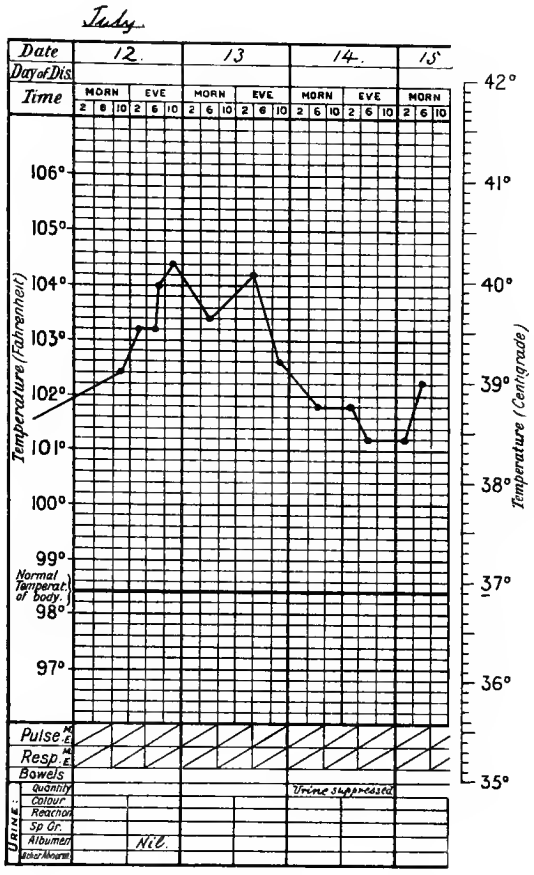
The spleen was enlarged, deeply congested, and of a bluish-black colour on section.

The kidneys: The right was very large, the left very small and lobulated; both were congested and dripped blood on section; their capsules stripped readily and small cortical hæmorrhages were noted.

CASE 36.

A Timber Merchant, aged about 40 years.

Previous History.—He had been in West Africa about a month. He arrived at Axim from England on June 15th. The following week he visited Seccondee, returning to Axim on July 6th. His previous tropical experience and his habits as regards quinine prophylaxis were not known. He had been suffering from indigestion for the two weeks before his illness, for which he did not receive any treatment.



History of Present Illness.—On July 12th he sent for medical advice in the evening. He then complained of headache; his temperature was 104°; the pulse 85 beats to the minute and there was some deafness. He was given phenacetin grs. x and quinine grs. x. There was no jaundice, vomiting, nor albuminuria.

On July 13th, in the morning, the temperature was 101·8°. The pulse, 76 beats to the minute. He was so much better that his employer said there was no necessity for the doctor to call again. At 8 p.m., however, the doctor was again sent for; he was now very much weaker and his temperature was 101·2°. No urine was passed after this day.

On July 14th, at 6.30 a.m., the temperature was 101·4°. He got out of bed and fell on the floor. There was some vomiting during the day.

On July 15th, at 8.30 a.m., he died.

Post-mortem Examination.—It was noted that jaundice was present.

The liver was enlarged and yellowish in colour.

The spleen was not enlarged; it was slightly darker than normal.

The bladder was empty.

The heart was normal.

The lungs: old adhesions were found in the left pleural cavity, otherwise they were normal.

The stomach: There was a growth at the pyloric end, otherwise it was normal.

The kidneys were enlarged, but otherwise normal.

CASE 37.

A Negro of the Yoruba tribe, aged about 30 years.

The Previous History was not obtainable. The patient had come to Lagos from Ilesha to look for work. He had only been in Lagos two days when he was taken ill.

History of Present Illness.—The patient was carried into hospital. There was a history of his having been ill for two days. No history of fever or vomiting could be obtained. He was said to have passed in the morning "about two handfuls" of highly coloured urine like blood. On admission his sclerotics were tinged a deep yellow. but there was no suffusion of the conjunctivæ; the pupils were dilated and reacted fully to light; the temperature was 99·8°; the pulse small, numbering 92 per minute. He was in a stuperose condition, would not reply to questions and responded to orders after an interval had elapsed. Later, a blood examination for malaria parasites proved to be negative. No urine was passed during the time he was in hospital. The heart-sounds were feeble and distant; no murmurs were detected; the pulse was feeble, small, and scarcely to be felt at the wrist.

On the morning of July 29th he was quite unconscious; the respirations were 44 to the minute; the pulse 125. The heart-sounds were very feeble and an examination of the chest revealed nothing abnormal. Black blood-stained fluid issued from the mouth at intervals and there was occasional hiccough. The sclerotics were deeply bile-stained; the pupils were dilated and fixed; the conjunctival reflex was abolished and occasional lateral nystagmus was present. As the bowels had not moved, an enema of soap and water was given; a watery bile-stained fluid was returned. No paralysis of any kind was noted. He died at about 3.30 p.m.

Post-mortem Examination.—This was made on the evening of July 29th.

There was an ecchymosis under the skin.

The heart was somewhat flabby; the valves were normal; two sub-endocardial hæmorrhages were found in the left ventricle about one-third of an inch, each, in diameter.

There was no fluid in pericardium or pleura.

At the base of the left lung there were slight adhesions and the lung itself was œdematous. In the right lower lobe there was an area of consolidation, red, engorged, and pneumonic in character.

All the viscera were deeply bile-stained.

The stomach was dilated, its blood vessels were injected, and it contained a dark grumous-looking fluid—this fluid was negative to the guiacum and ozonic ether test for blood. There were no ecchymoses in the mucous membrane.

The lower end of the appendix was inflamed and the vessels of the intestines were injected.

The liver was deeply bile-stained, fatty looking, but not enlarged.

The spleen was firm and congested.

The kidneys were congested.

The bladder was empty.

The brain was slightly œdematous; its membranes were bile-stained but they shewed no hæmorrhages.

Laboratory Report.—The liver cells in the portal zone were in a state of advanced cloudy swelling, their nuclei were indistinct and some of the cells were breaking down.

The kidneys were in a state of cloudy swelling; the convoluted and collecting tubes were filled with granular debris.

The spleen shewed no marked change.

CASE 38.

A Negro of the Kroo tribe, between 45 and 50 years old. Employed by one of the trading firms in Lagos as a labourer.

Previous History.—He stopped work on July 27th and was well up to August 5th, when he complained of vomiting blood and of passing blood in his stools.

History of Present Illness.—As already stated he was taken ill on August 5th.

On August 6th he was brought to hospital in a dying condition. He was said to have vomited blood during the night. As the pulse was very rapid and feeble, a hypo-

dermic injection of strychnine gr. $\frac{3}{100}$ was immediately given and also a rectal injection of warm normal saline solution. The heart-sounds were distant and feeble and the heart's action rapid; the pulse rate was 118 beats to the minute. At the base of the left lung, posteriorly, there were dulness on percussion, diminished air entry, and mucous râles. The abdomen was tender and resistant to pressure all over, and the patient complained of pains in his belly. The breathing was rapid and shallow. The mouth was in a very filthy condition: the tongue covered with sores, the teeth exceedingly dirty, and the breath very foul. A little blood-stained fluid trickled from the mouth. The temperature was 99°. After admission he vomited a little dark blood-stained fluid, not unlike "coffee-grounds," on two occasions. He passed no urine after admission, but the stretcher on which he was brought to the ward and his trousers were wet with fluid. The rectal injections returned blood-stained fluid. He was induced to swallow a little milk after admission, but he rapidly became unconscious and died at 3.30 p.m.

A Post-mortem Examination was made on August 7th.

The body was that of a well-nourished muscular man between 45 and 50 years of age and about 5 ft. 5 in. in height.

About half an ounce of clear fluid was found in the peritoneal cavity.

All the viscera were deeply bile-stained.

The spleen was slightly enlarged and firm in consistence.

The kidneys were slightly enlarged and congested.

The bladder was empty.

The stomach: Towards the pyloric region mainly on the posterior wall was a large sub-mucous hæmorrhage about three inches square.

In the duodenum, and in the first few inches of the ileum, numerous petechial hæmorrhages were found.

In the lower part of the large intestine, descending colon, and rectum, numerous small sub-mucous hæmorrhages were also found. No other lesions were discovered.

The stomach and intestines were almost empty, the former containing a small quantity of coffee-coloured fluid.

Laboratory Report.—The stomach contents shewed on examination broken-down red blood corpuscles and fibrin, numerous diplococci in sheaths, large and small streptococci, rod-shaped bacilli and sarcinæ.

The liver shewed cloudy swelling and yellow pigment.

The spleen shewed numerous cocci in groups and chains, rod-shaped bacilli, some of them in chains.

The kidneys shewed cloudy swelling; the convoluted tubules were filled with granular debris, their cells breaking down and losing their nuclei. Many of the convoluted tubules contained red blood corpuscles.

The lungs were in a pneumonic condition in patches; they shewed numerous red blood corpuscles, lymphocytes, streptococci, diplococci, some of the latter encapsuled; also rod-shaped bacilli (not tubercle), some of them in chains.

CASE 39.

A European, age and occupation not recorded.

Previous History.—No record.

History of Present Illness.—The patient was admitted to hospital on 6th February, 1911. This was the first occasion on which he was seen during this illness, though it was stated later that he had been ill for at least a fortnight and had been advised to attend the hospital. He was very averse to becoming an in-patient, but was assured that it was necessary.

On admission he was very jaundiced and constipated, with furred tongue and loss of appetite. His temperature in the mornings was normal, rising in the evenings to between 99° and 100°. He complained of no pain and exhibited no other symptoms. The size of the liver, as delimited by palpation and percussion, was normal and shewed no change from the condition when he was examined for insurance on October 10th, 1910. There was no tenderness over this organ and nothing palpable in the region of the gall bladder.

He was placed on a milk diet and treated with calomel, pil. hydrargyri and sodium sulphate.

His condition remained practically unaltered until the 19th, when his temperature suddenly rose to 102° and the jaundice became still more intense, amounting to a deep bronzing. He was given quinine and his blood was examined, but as no parasites were found the quinine was stopped. His temperature varied between 102° and 103°, but there was still no tenderness or other sign. It was evident that his condition was one of acute biliary obstruction, but there was nothing to define its pathological cause. There was no history that could be construed into an indication of gall stones and no indication of abscess or tumour, except the temperature; nor was there ascites. Fomentations containing nitro-hydrochloric acid were now applied over the liver. Bilious vomiting occurred occasionally.

On the 22nd the area of hepatic dulness was thought to be contracting, and the next day this was certain. The temperature on the evenings of the 22nd and 23rd rose to about 104° and the patient was evidently becoming much weaker. Brandy was used as a stimulant.

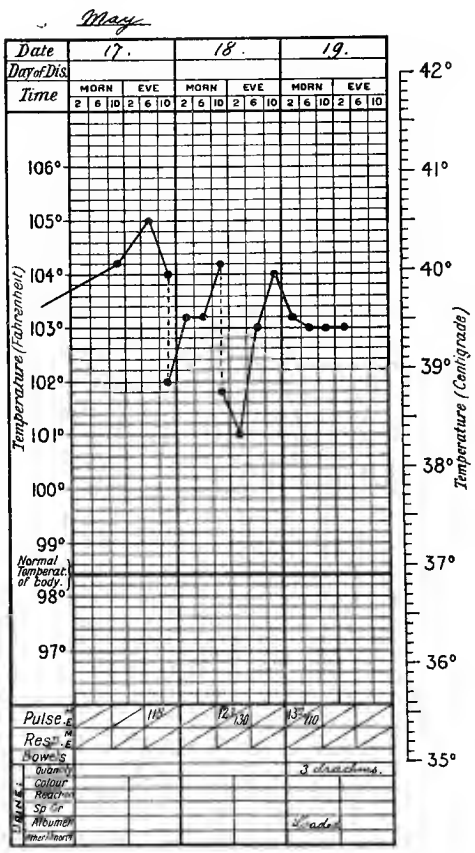
On the 23rd and 24th his mind was at times confused, and on the latter day he lay in a semi-comatose condition and vomited a good deal of bile from time to time. He sank and died quietly late that afternoon. Only once until death occurred did the temperature reach as low as 100°.

Post-mortem Examination.—The autopsy shewed the liver to be greatly contracted and of an almost uniform yellow colour; it was harder than usual on section. It contained no tumour or abscess. The gall bladder was not distended. All the organs and tissues were deeply pigmented with bile, but were healthy. There was no excess of fluid in any of the body cavities. A diagnosis of acute yellow atrophy of the liver was made.

CASE 40.

A Merchant, age not recorded.

Previous History.—He had been from about 17 to 19 days in Accra this tour. His first tour was spent in Akuse. His previous tropical experience, previous illnesses, and habits as regards quinine prophylaxis were not known. He had been working in an ill-lit kerosene store amongst Kroo-boys, as well as in an outer office.



History of Present Illness.—(There are very few details of this patient's illness.)

The blood was examined twice; no malaria parasites were found on either occasion. An ice bag was applied to his head and tepid and cold sponging and the ice pack were applied as required. One-tenth of a grain of pilocarpine nitras was injected hypodermically and half an ounce of the following mixture:—

℞. Sodii Bicarbonatis	...	dr. ii.
Liq. Hydrang. Perch.	...	oz. ii.
Aq. Chlorof. ad ...	...	oz. xii.

was given every three hours.

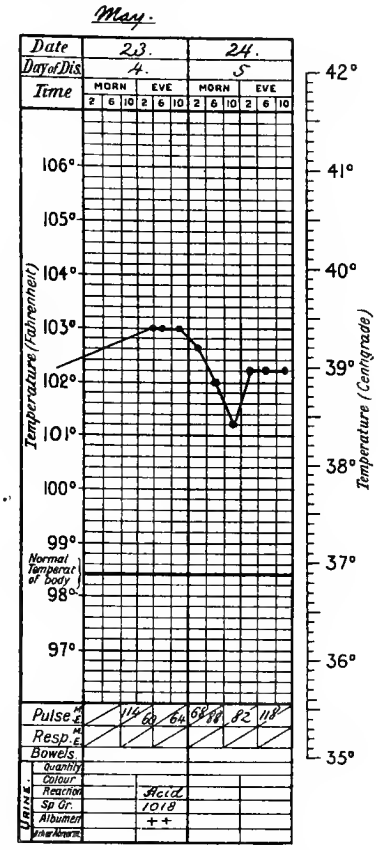
He died on May 19th.

No Post-mortem Examination was made, the diagnosis of Yellow Fever being considered sufficiently certain.

CASE 41.

A Merchant, aged about 24 years.

Previous History.—He had been seven months in West Africa. He had had no previous tropical experience. There was no record of any previous illness. He had taken 0·8 gr. of quinine every fourth day. He had been working in an office adjoining the one in which Case 42 worked and occasionally visited this clerk's room.



History of Present Illness.—He went to bed on May 20th suffering from what was presumed to be a malarial attack. Medical advice was not sought until May 23rd at 3.30 p.m. He had been treated with quinine; he complained of severe pains in the loins; Faget's sign was present. The temperature was 103·4°. The pulse rate was 54 beats to the minute. The urine was acid in reaction and loaded with albumen; its specific gravity was 1018. A diagnosis of Yellow Fever was made and he was admitted to hospital at 5 p.m. There had been vomiting on the 20th, but there was none subsequently up to the time of admission. On admission there was marked pain and tenderness in the epigastrium. The conjunctivæ were injected and tinged yellow. There was severe headache. The tongue was coated with fur, but the papillæ were very noticeable. There were red spots on the floor of the mouth. The icteric tint was noticeable round the ears. There was intense pain in the loins. He was given soda-water every half hour.

On May 24th, at 2 a.m., he passed a tarry motion. Sponging was resorted to and the patient was given ice to suck. There was extreme restlessness. At 6 a.m. he was jaundiced all over. Caffeine citrate and digitalin were injected. At 2 p.m. he vomited "black-vomit" and became unconscious. Tarry motions were frequently passed; the pulse failed; black vomit again occurred at 5 p.m. and 8 p.m., and from that time onward frequent eructation occurred until the patient died at 10.45 p.m. Death was due to uræmia and cardiac failure.

Results of blood examination:—

No malaria parasites were found.

Differential Leucocyte Count.

Polymorphonuclears	82·25 %
Large Mononuclears	4·00 %
Lymphocytes	12·00 %
Eosinophiles	0·50 %
Transitionals	1·25 %
	100·00

A Post-mortem Examination was held on May 25th. The skeletal development and general nutrition were good. There was much discolouration of a hypostatic nature, as well as a marked icteric tingeing of the skin of the face; this was not so marked on the rest of the body. There were old diffuse scars on the neck and chest and an injection mark on the right arm. The appearance of the abdomen was normal. Post-mortem rigidity was well marked. The superficial fat was tinged a deep yellow.

The lungs and larynx were normal.

The heart and blood vessels: Excepting that the fat of the heart was tinged yellow, their macroscopical appearances were normal.

The spleen, enlarged about one and a half times the normal size, was firm, and of a maroon-red colour.

The liver was normal in size and of a nutmeg colour. The gall bladder was normal.

The kidneys were normal in size and appearance. Their capsules were slightly adherent.

The stomach: Towards the pyloric end were four hæmorrhagic patches. The largest was about one and a half inch long by a quarter of an inch broad; the others were more or less circular, and ranged from a quarter to half an inch in diameter. The stomach contained about half a pint of a thin and watery deep black-brown fluid.

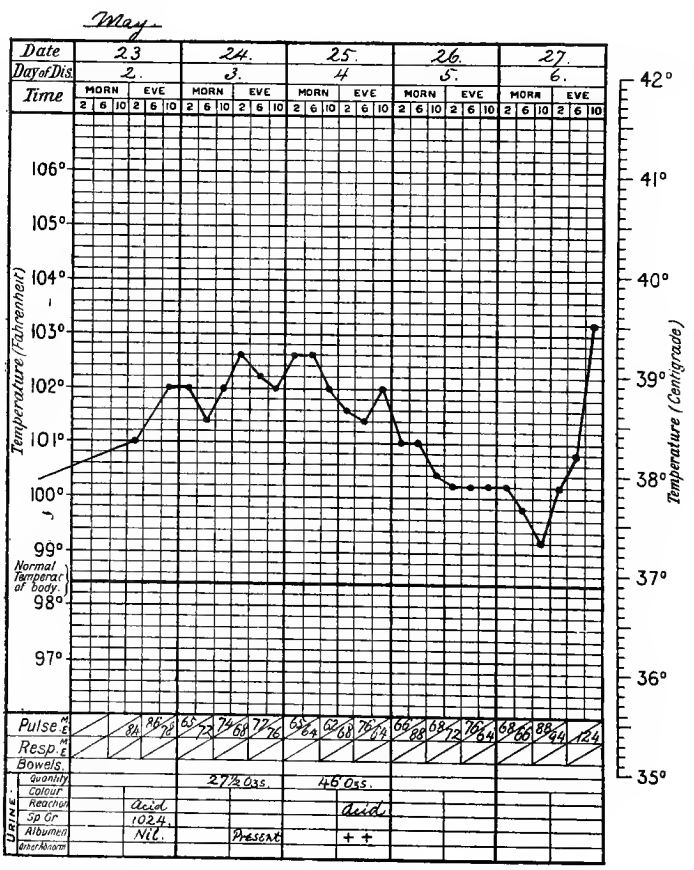
The intestines: The omental fat was tinged yellow.

Laboratory Report.—Nothing abnormal was found in smears taken from the spleen, liver, and kidneys.

CASE 42.

A Merchant, aged about 27 years.

Previous History.—He had been three months on the Gold Coast. He had no previous tropical experience. There was no history of any previous illnesses. He had taken 0·8 gr. of quinine every fourth day. He had been working in an ill-ventilated, badly lighted store from which Kroo-boys were continually removing bales. Two of these Kroo-boys subsequently sickened of Yellow Fever. (Cases 43 and 44.)



History of Present Illness.—He was first seen by the doctor at the same time as Case 41, who occupied an adjoining bedroom. He had felt ill on the previous afternoon, had vomited, and had suffered from intense headache and pains in the loins and legs. The conjunctivæ were slightly injected and the face had a ferrety expression. Pulse 84 beats to

the minute; temperature 101°. The urine was acid, its specific gravity was 1024, and it did not contain albumen. He was at once admitted to hospital. An enema of soap and water was given and acted well. Soda-water every quarter of an hour was prescribed.

On May 24th the urine passed at 1.20 p.m. contained albumen. Twenty-seven and a half ounces were passed during the day. He was very restless, but slept at intervals.

During the night he slept from 12 midnight to 2 a.m. and from soon after 2 to 5.30 a.m.

On the morning of May 25th he felt much better and was very hungry; he wished to sit up and have books to read. He slept at intervals during the day. At 5.40 a m. he passed two motions, the first of which was a little dark; the second was distinctly tarry. At 5 p.m. he became restless. He complained of the weight of the blankets. At 10.15 p.m. he was inclined to vomit. Ice was given to him to suck. The lowest pulse rate during the day was 60 beats to the minute. He passed forty-six ounces of urine during the day, which was acid in reaction and loaded with albumen. He also passed three firm, but pale, motions.

On May 26th during the twenty-four hours, he passed fifty-four ounces of urine, which was acid in reaction and loaded with albumen.

On May 27th, at 4 a.m., he was inclined to vomit. He was markedly restless and screamed when touched. At 9.5 a.m. a hypodermic injection of caffeine citrate was given, the injection causing such intense pain that the patient bit his arm. At 11 a.m. he was delirious. There was marked suffusion around the ears. The conjunctivæ and skin over the malar bones were tinged yellow. He passed his urine in bed. At 12 noon there was tremor of the lower jaw. He slept for an hour and a half. At 4 p.m. the pulse was 132 beats to the minute. The maximum respiration (Cheyne-Stokes breathing) 60 to the minute. A hypodermic injection of digitalis was administered. At 10.40 p.m. black hæmorrhage and persistent oozing of blood from the mouth, accompanied by eructations, were observed.

On May 28th, at 12.15 a.m., the patient died.

The results of the blood examinations made during the patient's illness were as follow:—

A film taken on May 24th showed no malaria parasites.

Polymorphonuclears	86·07 %
Mononuclears	4·70 %
Lymphocytes	7·64 %
Eosinophiles	0·19 %
Transitionals	0·76 %
Mast Cells	0·38 %
	99·74

A film taken on May 27th showed no malaria parasites.

Polymorphonuclears	74·50 %
Large Mononuclears	5·75 %
Lymphocytes	12·00 %
Eosinophiles	1·25 %
Transitionals	6·25 %
Mast Cells	0·25 %
	100·00

A Post-mortem Examination was held on May 28th. The skeletal development and general nutrition were good. The abdomen was of normal appearance. Post-mortem rigidity was marked. There was a generalised icteric tingeing of the skin. Hypostatic staining was also marked in places.

The heart and blood vessels were normal.

The lungs and larynx were normal.

The spleen was small, very friable, and of a deep red colour.

The liver: "boxwood" yellow and firm. The gall bladder was thickened; there was much hæmorrhagic infarction of the internal mucosa, especially about the neck of the gall bladder.

The stomach contained a small quantity of a deep black-brown coloured material, of a somewhat grumous consistency. There was marked hæmorrhagic congestion of the stomach along its lesser curvature, especially at the cardiac and pyloric ends.

The intestines were normal.

The kidneys were large, but otherwise normal; one of them showed on section two hæmorrhagic patches.

The bladder wall was much thickened; it contained about six ounces of urine; its mucosa were slightly injected.

CASE 43.

A Negro Labourer, who had lived all his life in West Africa.

Previous History.—There was no history of any important illness. He had taken no quinine. He arrived in Accra in October, 1910. His movements immediately before this illness could not be traced.

History of Present Illness.—The patient was placed in a segregation camp under medical observation on May 23rd.

On May 24th he was found to be ill and said he had been ill for two days. His temperature was 103°. The pulse 100 beats to the minute. Albuminuria was present. No malaria parasites were found on blood examination. The patient was isolated.

On May 25th the pulse rate was noted to be 60 beats to the minute and rapidly falling. His sclerotics were yellow. Albuminuria was present.

On May 26th he was removed to the contagious diseases hospital.

On May 30th he had improved, but the pulse rate was 52 beats to the minute.

On May 31st the improvement continued. The pulse rate was 64 beats to the minute. A trace of albumen was still present in the night's urine.

The result of a blood examination during the illness was as follows:—

Polymorphonuclears	71·00 %
Mononuclears	6·25 %
Lymphocytes	17·00 %
Eosinophiles	4·25 %
Transitionals	1·50 %
	100·00

Neither malaria parasites nor pigmented mononuclears were found. The patient recovered.

CASE 44.

A Native Labourer, aged about 30 years.

Previous History.—He arrived in Accra in 1910. He was a negro, born and brought up in West Africa. Previous illnesses had not been recorded; he had had one or two trifling ailments of no importance. He had not taken quinine. His movements immediately before this illness could not be traced.

History of Present Illness.—On May 23rd he was removed to the segregation camp.

On May 24th he was examined and found to be ill. He stated that he felt ill on the previous day; his temperature was 105° and the pulse rate 120. No malaria parasites were found on blood examination and there was no albuminuria.

On May 25th the pulse rate was falling. There was no albuminuria

On May 26th the pulse rate was 60 beats to the minute. The sclerotics were yellow. Albumen was present in the urine. He was removed to the contagious diseases hospital.

On May 31st he was convalescent. Pulse 60 beats to the minute. A trace of albumen was present in the night's urine.

The result of a blood examination was as follows:—

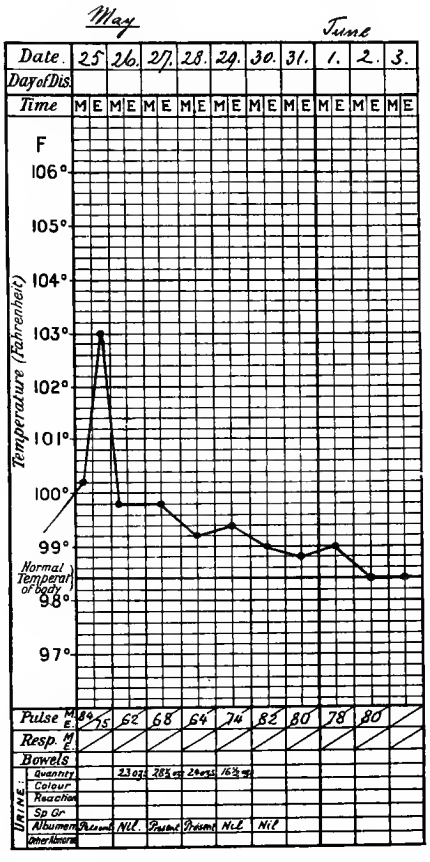
Polymorphonuclears	67·25 %
Mononuclears	5·00 %
Lymphocytes	24·00 %
Eosinophiles	4·25 %
Transitionals	0·25 %
Mast Cells	1·75 %
	102·50

No malaria parasites nor pigmented mononuclears were found.

CASE 45.

A Native Clerk in one of the Business Houses, aged about 40 years.

Previous History.—He was born and brought up in West Africa. Previous illnesses were not recorded, there were none recently. He had very seldom taken quinine and then only as prescribed by the doctor. He had been living in the native town of Christiansborg.



History of Present Illness.—The patient had been ill and staying in his home in Christiansborg since May 22nd. There was some vomiting on that day.

On May 25th, at 6 p.m., he was admitted to hospital. He complained of pain in the epigastrium and loins. The temperature was 100·2°. The pulse 84 beats to the minute. The conjunctivæ were tinged yellow. At 7 p.m. he passed urine which contained a small amount of albumen. At 9.45 p.m. the temperature was 103°; the pulse 75 beats to the minute. Soda-water was given every quarter of an hour.

On May 26th he slept from 1 a.m. to 5.30 p.m. Twenty-three ounces of urine were passed during the day; there was no albuminuria.

On May 27th the urine passed between midnight and 6 a.m. again contained albumen. Twenty-eight and a half ounces were passed during the twenty-four hours. The highest temperature recorded was 99·8°; the lowest pulse rate 68. The stools were somewhat dark in colour.

On May 28th there was very slight tingeing of the conjunctivæ. The lowest pulse rate was 64 beats to the minute. The stools were of a lighter colour. Twenty-four ounces of urine were passed during the twenty-four hours; all specimens contained albumen.

On May 29th the highest temperature was 99·4°. The lowest pulse rate 74 beats to the minute. Sixteen and a half ounces of urine were passed during the twenty-four hours; it did not contain albumen.

On May 30th the conjunctivæ were clear. The stools were normal. The highest temperature was 99°. The lowest pulse rate 82 beats to the minute. He was fed on milk and soda-water. Twenty-four ounces of urine were passed during the twenty-four hours; it did not contain albumen.

On May 31st the highest temperature was 99·8°. The pulse 80 beats to the minute. He was given Benger's food. Twenty ounces of urine was passed during the twenty-four hours, and did not contain albumen.

On June 1st the patient was given beef tea and custard. The highest temperature recorded was 99°. The lowest pulse rate 78 beats to the minute.

On June 2nd he was given full diet. The temperature was normal. The pulse 80 beats to the minute.

On June 3rd he was discharged from hospital.

The results of blood examination made during illness are as follows.

Blood examinations:—

A film taken on May 26th; no malaria parasites were seen.

Differential Leucocyte Count.

Polymorphonuclears	71·00 %
Large Mononuclears	6·25 %
Lymphocytes	17·00 %
Eosinophiles	4·00 %
Transitionals	1·50 %
Mast Cells	0·00 %
	99·75

A film taken on May 29th; no malaria parasites were seen.

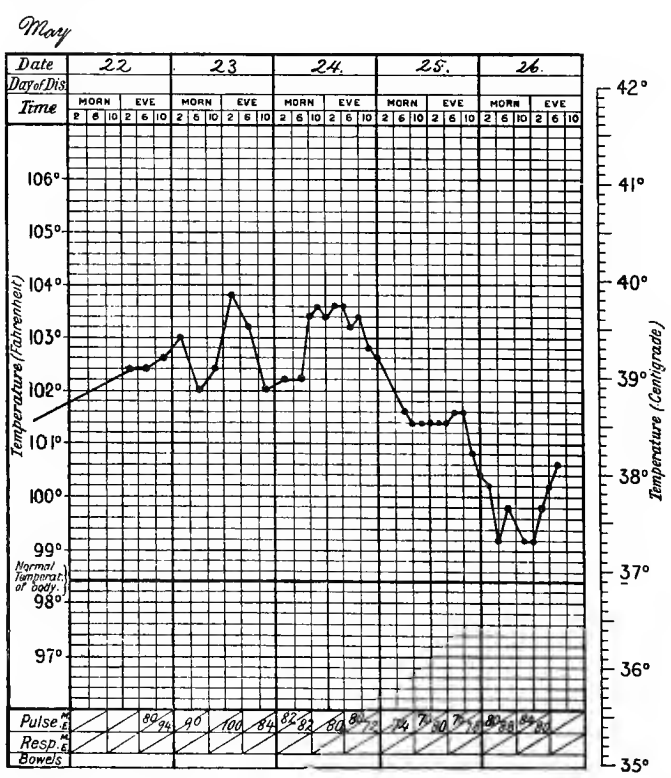
Differential Leucocyte Count.

Polymorphonuclears	67·25 %
Large Mononuclears	5·00 %
Lymphocytes	24·00 %
Eosinophiles	2·75 %
Transitionals	0·25 %
Mast Cells	1·75 %
	101·00

CASE 46.

An Electrical Engineer, aged 35 years.

Previous History.—He had done six tours of residential service on the Gold Coast. His tropical experience previous to that in West Africa, his previous illnesses, and his habits as regards the prophylactic use of quinine were unknown. He had been living in the Public Works barrack quarters with seven other Europeans and twelve native servants. He had been working at the Post Office in an annexe, underneath which was a damp store swarming with mosquitoes. The house in which Case 43 occurred was only 500 yards from the Post Office.



History of Present Illness.—No records of this can be found beyond a blood examination during his illness and the temperature chart:—

Polymorphonuclears	77·00 %
Mononuclears	6·00 %
Lymphocytes	11·75 %
Eosinophiles	0·50 %
Transitionals	4·75 %
	100·00

Neither malaria parasites nor pigmented mononuclear leucocytes were found.

Post-mortem Examination.—The skeletal development and general nutrition were good. There was much hypostatic discolouration of the skin—especially of the face—as well as of the dependent parts. Icteric tingeing was also pronounced, especially of the skin of the chest and of the conjunctivæ. Much blood and froth were issuing from mouth and nose. Post-mortem rigidity was marked. The abdomen was normal in appearance.

The lungs and heart were normal.

The spleen was rather large and congested. Smears shewed nothing abnormal.

The liver was large and of a boxwood yellow colour. The gall bladder was deeply stained and shewed a petechial patch at the fundus.

The kidneys: both were large; on section they shewed marked congestion; their capsules stripped readily; eight or nine petechiæ were seen on each.

The stomach contained a considerable quantity of semi-digested food. There were on its mucous membrane numerous petechial patches, rose coloured, round in shape, and varying in size from that of a half crown downwards; the mucous membrane was deeply stained and the superficial epithelium, especially that of the cardiac end, was desquamating.

The intestines were deeply stained by their contents—a dark coloured chyme.

CASE 47.

A Merchant, aged 35 years.

Previous History.—No record.

History of Present Illness.—On August 29th he stated that he had been feverish for the last three days. He complained of general malaise, and slight frontal headache. There was no vomiting nor pain in the stomach. There was nothing characteristic about the features, but he appeared somewhat restless. The temperature was 104° and the pulse rate 80 to the minute. The specific gravity of the urine was 1015; it contained neither albumen nor sugar. No blood examination was made.

On August 31st the general condition had improved a little. The temperature fell to 101 and the pulse rate was 70 to the minute. The patient perspired very freely during the day.

On September 1st there was no change in the general condition of the patient. The temperature was 100°; the pulse rate 70 to the minute. The urine contained neither albumen nor sugar.

On September 2nd the patient's condition was unchanged.

On September 3rd he became restless. The temperature rose to 104° and the pulse rate was 80 beats to the minute. The condition of the urine was unchanged.

On September 4tb his general condition was unchanged. The temperature was 103°; the pulse rate 80 to the minute.

On September 5th he became delirious; the temperature was 104°, and the pulse rate 80 to the minute.

On September 6th he became comatose and died at about 10 a.m.

Post-mortem Examination.—The skeletal development and the general nutrition of the body were good. The skin of the face shewed icteric tingeing, and there were ante-mortem bruises on the chest, thigh, and left knee. The abdomen was not distended. Post-mortem rigidity was marked.

The lungs shewed a generalized increase of fibrous tissue.

The spleen was large, maroon-red in colour, and soft.

The liver was somewhat enlarged, firm but otherwise normal. The gall bladder was normal but the contained bile was of grumous consistency.

The kidneys were hard and fibrous; they were, however, normal in appearance; their capsules stripped readily.

The bladder contained dark non-albuminous urine.

The mucous membrane of the stomach and jejunum was thickened and injected.

The pancreas was very large and fibrous.

There were some peritoneal adhesions.

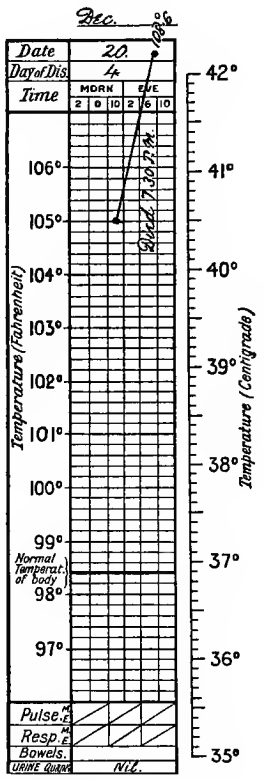
The state of the lymphatic system was normal.
The brain was normal.
No helminthiasis was found.

Laboratory Report.—Smears from the heart, the lungs, the spleen, liver, and brain were normal.

CASE 48.

A Clerk employed on the Railway, aged 29 years.

Previous History.—He had been twelve months on the Coast; he had had no previous tropical experience. Previous illnesses were not recorded. Quinine had been neglected, he had not taken any for some weeks. On December 17th he went by train to Nsawam and back. He spent some hours in the daylight at Nsawam. Otherwise he had been living continuously in the railway quarters, except that for the last fortnight he had been sleeping in the native town; he was in the habit also of visiting native houses and there was a recent history of C_2H_6O.



History of Present Illness.—He was taken ill on the evening of December 17th, and, continuing to feel ill on the 18th and 19th, remained in his quarters.

On December 20th he felt better and returned to duty, but subsequently returned to his quarters and, becoming worse, sent for the doctor. His temperature was then 105° in the mouth. He was given antipyrin grs. x and hot tea; he was covered with blankets and began to perspire freely. There had been no vomiting nor jaundice; the heart, liver and spleen appeared to be normal. After the doctor left him he became delirious and rushed out of his quarters into the bush; here he was picked up by his servants and taken back. At 5 p.m. he was breathing stertorously, he was unconscious and the radial pulse was scarcely perceptible. The temperature in the axilla was 108·6° and the skin was dry and hot. Strychnine was injected hypodermically; he was sponged with cold water and the cold pack applied. Ten grains of quinine were injected intramuscularly and strychnine was again injected. He, however, died at 7 p.m. of cardiac failure, the temperature in the axilla being 108° at that time. No blood examination was made, nor was the urine tested.

Post-mortem Examination.—The skeletal development and general nutrition were good. There was much discolouration of the skin about the shoulders from hypostasis, less in other parts of the body. The skin was otherwise normal. The conjunctivæ were white. The abdomen was not distended. Post-mortem rigidity was present.

The brain was markedly congested. Seven superficial ecchymoses were found along the median line falling sometimes on one, sometimes on the other, hemisphere; one was on the lobe of the cerebellum; they were about the size of half a crown and shaded off at the periphery. The meninges were congested.

The heart was empty of blood. The aortic valve was thickened and nodular. The internal aspect of the left ventricle showed an ecchymosis about one inch long by half an inch broad.

The lungs: Both lungs were markedly congested and there was much hypostasis at their bases.

The spleen was normal in size. On section it was maroon-red in colour and of almost fluid consistency.

The liver was of normal size, not congested, firm on section and of a brown-yellow colour.

The gall bladder was distended with bile; its mucous membrance was normal.

The stomach contained about two ounces of light red-coloured fluid. At the œsophageal end there was a large ecchymosis covered by a thin layer of clotted blood which occupied about one-third of its mucous membrane and shaded off towards the pyloric end. The rugæ of the rest of the stomach were injected.

The intestines: The veins and capillaries were distended in small patches at several places in the small intestine.

The kidneys: Both kidneys were engorged with blood; the capsules stripped readily. The right kidney had a small cyst or bleb beneath the capsule at about the middle of its convexity.

The bladder contained about two ounces of urine which was albuminous and which yielded a deposit consisting almost entirely of epithelial cells—mostly columnar epithelium.

Laboratory Report.—Nothing abnormal was found in smears from the liver, spleen, brain, and stomach wall.

CASE 49.

MANAGER OF A RUBBER ESTATE; AGE NOT KNOWN.

Previous History.—He first went to West Africa in 1901. This was his second tour in Avreboo. He had also visited India and Russia. He had always enjoyed good health, but had a "small attack" of fever when on leave. He had been living in a bungalow near a native village which was infested with mosquitoes.

History of Present Illness.—He died without skilled assistance. The following information was gathered from a European companion: "Mr. — woke me up during the night of June 22nd and said he had fever, and was vomiting. I have no thermometer, so I do not know what his temperature was. He took phenacetin and quinine, and he appeared to become less feverish, but both fever and vomiting continued throughout the next day.

"On the 24th he appeared to be much better, but was very restless and could not sleep. He had not complained of pain. The bowels were open, and he was passing urine freely. The urine was normal in colour. He was worse on Sunday, the 25th, and vomited off and on. He got weaker, and stopped passing urine on the morning of the 26th. During the day he became stone deaf. He began to vomit blood that evening, and, becoming unconscious, died about half-past seven on the morning of the 27th."

Post-mortem Examination.—The stomach contained a little dark blood; its mucous membrane was ecchymosed and extraordinarily rugous.

The small intestine was also ecchymosed and its mucous membrane rugous.

The spleen was enlarged, flabby, and friable.

The kidneys were enlarged. There were pin-point ecchymoses on their cortical surfaces.

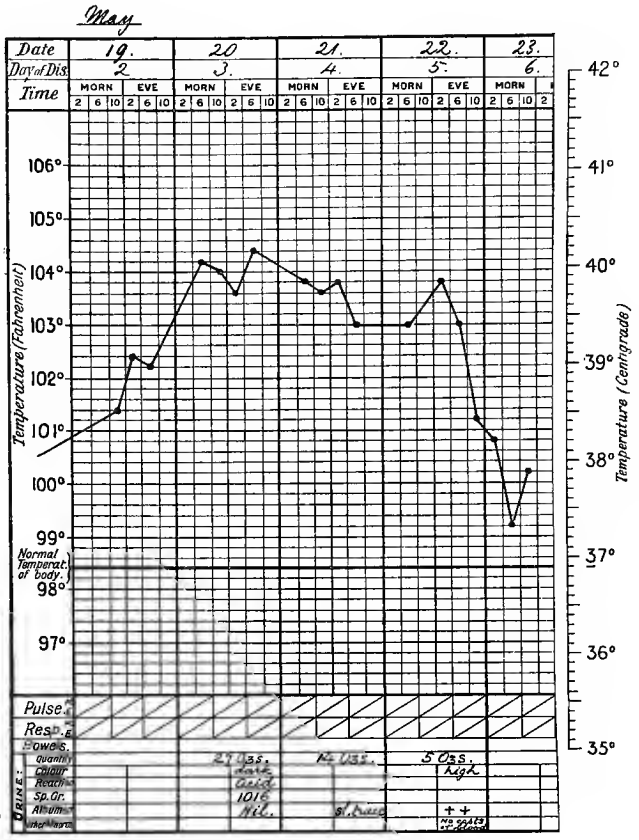
The liver was pale and fatty looking.

The bladder contained one and a-half ounce of urine, which yielded a heavy deposit of albumen on boiling.

CASE 50.

A Surveyor, aged 31 years.

Previous History.—He had been nearly six months in Bathurst. There was no record of previous tropical experience apart from West Africa. He had been employed in making a survey of Bathurst town with Case 51.



History of Present Illness.—On May 18th the doctor was called in to see the patient, who occupied the same quarters as Case 51, whom he had just seen. He was in bed complaining of headache and constipation, and had a temperature of 102° and a pulse of 108; his face was flushed, the tongue dry and furred. Calomel grs. v. was administered, but was very soon vomited. At 6.30 p.m. he was in much the same condition, and had not perspired. He was given phenacetin grs. x. which he retained, but the temperature had not altered when he was seen again at 11 p.m.

On May 19th the patient was admitted to hospital with a temperature of 104·4°; pulse 104. Beyond a slight headache he complained of no discomfort. As the bowels had not moved, a further dose of calomel grs. v was given and retained, followed by a saline draught a few hours afterwards. Examination of the blood revealed the presence of no malaria parasites, but quinine bihydrochlorate grs. x was administered after the bowels had moved freely; the temperature rose to 102·4° by 2 p.m., and gradually rose to 104·4° by the next morning, with the pulse at 104 and of good volume.

May 20th. During the day the patient became restless, and his stomach rejected even small quantities of dilute food. The bowels were moved three times copiously, the stools being liquid and of dark bilious character. At 6 p.m. the temperature was 104·6°, and the pulse rate had risen to 120. Twenty-seven ounces of urine were passed—sp. gr. 1016—acid and rather dark in colour; no trace of albumen could be found, nor was sugar or bile present.

On May 21st, in the morning, the temperature was 103·8°, and the pulse had dropped to 96 to the minute. The patient remained very quiet all day, and refused all nourishment except iced water. Towards evening the temperature fell to 103°, after an intramuscular injection of quinine. For the first time since admission the urine contained a faint trace of albumen, and the quantity passed was considerably less—14 ounces only.

On May 22nd, the temperature fluctuated between 103° and 104° until 6 p.m., when it dropped to 101·2°, and the pulse varied between 94 and 102. Small quantities of weak peptonised chicken jelly were tried by the mouth, but immediately rejected. After clearing

the bowels of very dark fæces by a warm soap and water enema, six-ounce normal saline injections were administered every three hours by the bowels and retained; the kidneys only excreted 5 ounces of highly coloured urine, containing a large quantity of albumen, but no blood or casts were observed under the microscope. The pulse became more rapid and feeble, and the patient was very depressed. At 2 p.m. vomiting set in (and persisted up to the end), gradually assuming the characteristic "coffee-ground" colour. Weak brandy and water and solutions of perchloride of iron by the mouth and strychnine hypodermically were tried, but were either rejected or proved to be useless.

On May 23rd the temperature fell in the morning to 99·2°, and the pulse rate rose to 124, and was soft and easily compressible—vomiting continued, and the tongue and mouth were very much excoriated. The patient gradually became weaker, and died quietly at 4.25 p.m.

A Post-mortem Examination was made at 5 p.m.

The body was well nourished. The skin and scleræ were faintly tinged yellow.

The lungs were slightly collapsed and tightly adherent to the pleura over the left base.

The pericardium contained 3 to 4 drachms of clear straw-coloured fluid and was distended noticeably by the right auricle.

The heart weighed 12 ounces. The right auricle was very much distended with dark liquid blood. The valves were normal and competent; the muscular tissue was healthy.

The liver weighed 52 ounces and shewed no signs of fatty degeneration. The gall bladder was empty.

The spleen was normal and weighed 6 ounces.

The kidneys weighed 7 ounces each and were congested; their capsules stripped readily.

The suprarenal capsules appeared to be normal.

The pancreas was normal.

The stomach was distended with gas, and contained 3 ounces of half-digested blood quite black. The mucous membrane was very much inflamed and the inflammation spread over the pyloric orifice into the duodenum.

The small and large intestines appeared to be quite normal, but contained a few blackish flakes.

The lymphatic glands all over the body were not appreciably enlarged.

The head was not opened.

Smears and sections of all organs were removed for transmission to the London School of Tropical Medicine.

The post-mortem examination confirmed the diagnosis of Yellow Fever.

Laboratory Report.*

Suprarenals, Pancreas, Heart muscle, Stomach — Nothing abnormal detected.

Spleen.—This shows great congestion and some increase in the fibrous tissue. No parasites detected.

Kidney.—Slight degeneration of the cells lining the tubules—cloudy swelling.

Liver.—Fatty degeneration and infiltration fairly well marked. Some necrosis of the liver cells. Portal vessels injected.

Stomach contents.—Consisted of altered blood, fat globules, some crystals.

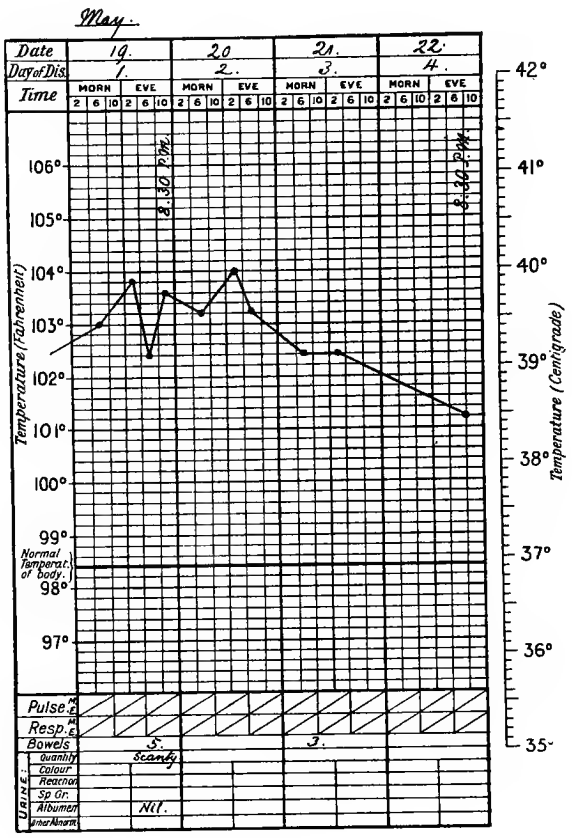
Blood film.—Shewed nothing abnormal. None of the bodies described by Seidelin as occurring in the red cells in Yellow Fever cases were seen.

* By permission of the London School of Tropical Medicine.

CASE 51.

A Surveyor, aged 32 years.

Previous History.—He had been seven months in West Africa. Previous tropical xperience; he spent two years and three months in East Africa before going to the Gambia. His previous illnesses and his habits as regards the prophylactic use of quinine were not known. He had been employed in surveying the town of Bathurst. He played football on the day before his present illness.



History of Present Illness.—On May 18th the doctor was called in to see the patient at his quarters and found him sitting in a chair complaining of fever, pain in legs, and biliousness. The previous day the patient had been playing football and felt all right, but after the game was over he thought he had contracted a chill by not immediately changing his clothes. He was put to bed, and on examination the skin was found to be hot and dry and his temperature 103·2°. The spleen and liver were not enlarged, the tongue was clean; ten grains of quinine were administered. At 6.30 p.m. the temperature had not subsided, although perspiration had been profuse, and at 11 p.m. it was decided to admit him to hospital the following morning, as he was restless and complained of severe headache, and refused medicine.

May 19th. On admission the temperature was 103° and the pulse 90. The tongue was slightly furred on the upper surface and dry, but the edges were clean and red. The patient was very restless—tossing from side to side—and it was difficult to get him to answer questions. Beyond complaining of dryness of the mouth, the patient appeared to suffer little discomfort. The skin and scleræ were not jaundiced, and vomiting was not very marked on admission, although distinctly bilious. Five grains of calomel were administered at once, followed by a saline purge at 4 p.m., and as the patient complained of hunger a few ounces of beef tea were given at intervals and retained. The urine passed was scanty, but contained neither bile, albumen, sugar, nor casts. On examination of the blood, malaria (tertian) parasites were found, as a result of which quinine bihydrochlorate was continued in the form of vaporole grs. v. given intramuscularly twice a day, but with no effect on the temperature. The bowels were freely relieved by the aperients, and the motions were very dark and offensive.

On May 20th the temperature reached 104° and the pulse was quicker and more easily compressible. Vomiting became troublesome, and only iced water could be retained —towards the evening the character of the vomit very noticeably altered; it assumed the appearance known as "coffee-ground vomit," and was almost black. Weak solutions of perchloride of iron and glycerine were tried by the mouth, but were invariably rejected. The patient took no notice of his surroundings, and as the heart began to fail stimulants became necessary. The stomach was so irritable that no drug could be administered by the mouth—five minims of liq. strychnine were given hypodermically every three hours until the following day. Rectal injections were not retained.

May 21st. After a restless night the patient was worse—the vomiting was more persistent and particularly black, the temperature began to decline, and by 8.30 p.m. was 100°. The breathing became laboured and rapid, and delirium set in. There was no jaundice. The pulse became very rapid, and the patient died the following morning.

On May 20th—that is two days after the onset of his illness—the case was regarded as suspicious of yellow fever, and as the symptoms developed the diagnosis became more decided, and was confirmed by the post-mortem examination.

A Post-mortem Examination was made two hours after death.

The body was well nourished. The skin and scleræ were slightly tinged a dirty yellow. There were no external marks or scars worthy of note and no ecchymoses.

On opening the abdomen a subcutaneous layer of fat from an inch to an inch and a half in thickness was found, and fat was plentifully distributed amongst all the internal organs.

The lungs were both collapsed, but otherwise healthy. There were no adhesions.

The pericardium was healthy, but very much distended by the right auricle.

The heart was much enlarged and weighed 17 oz. There were considerable deposits of fat over its surface and the right auricle was greatly distended with dark liquid blood. The valves were competent. Fatty degeneration of the muscle was absent. There were small patches of atheroma at the commencement of the aorta.

The liver weighed 58 oz. and was yellow and fatty in appearance. The gall bladder was empty.

The spleen weighed 8 oz. and was rather congested.

The kidneys weighed 7 oz. each. They were very congested. Their capsules stripped easily.

The suprarenal capsules were easily detached and of normal appearance.

The pancreas was normal.

The stomach was markedly hour-glass in shape and dilated. It contained about 5 oz. of black flocculent liquid and the whole of the mucous membrane was very red and congested. Three scars of old ulcers were observed.

The duodenum was also congested on its inner surface.

The jejunum and ileum appeared normal and contained a small amount of blackish mucoid material. Peyer's patches were well marked.

The large intestine also contained dark liquid fæces, but otherwise appeared normal.

The lymphatic glands were not enlarged and appeared healthy.

The head was not examined.

Smears and sections of all organs were taken for transmission to the London School of Tropical Medicine.

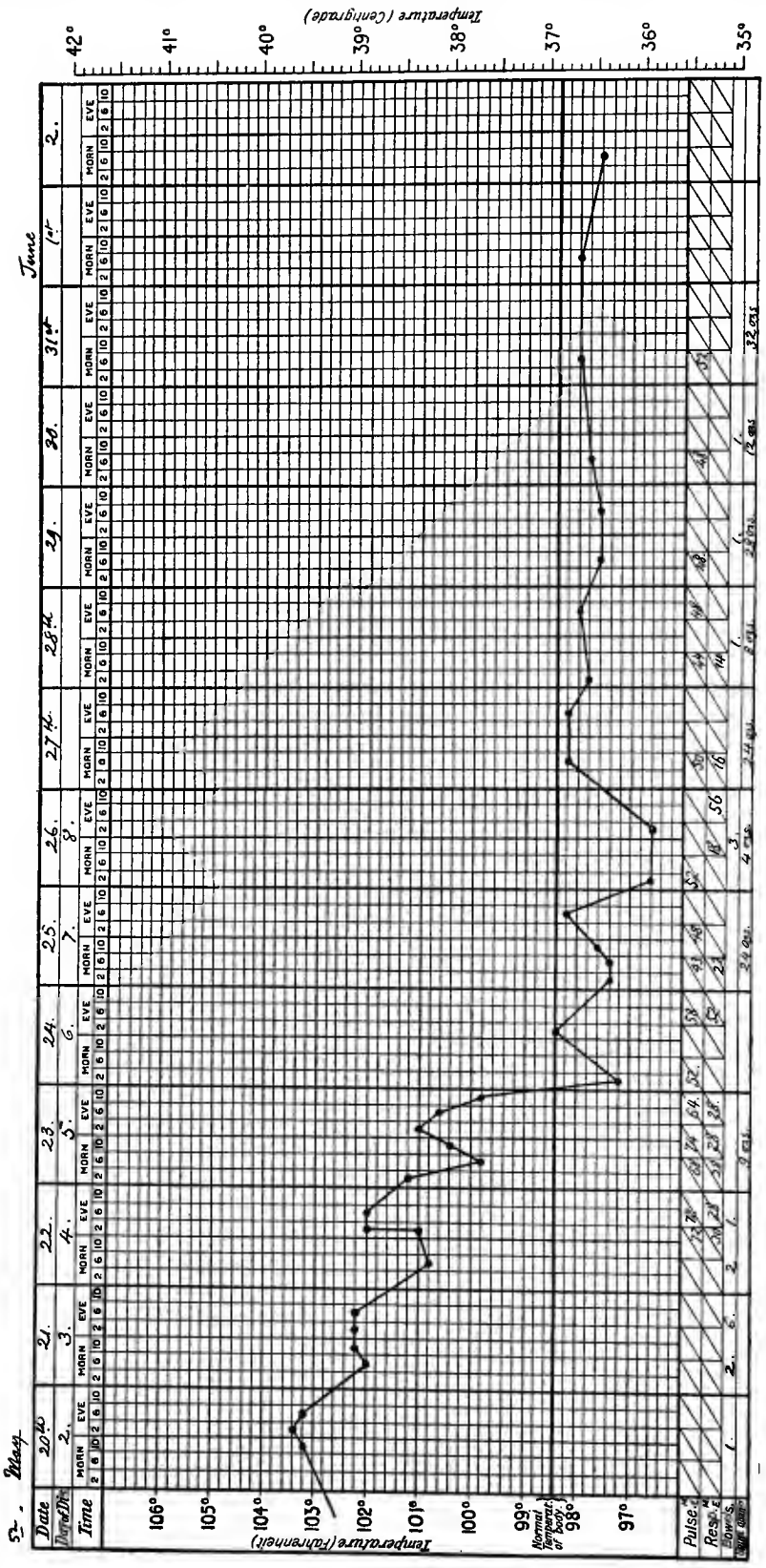
Laboratory Report.*—The results obtained in this case showed practically the same changes as were found in Case 50. The kidneys, however, shewed more congestion.

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CASE 52.

A Clerk employed by one of the Trading Firms in Bathurst, aged 23 years.

Previous History.—He had resided in West Africa for nineteen months. He had no previous tropical experience. No previous illness was recorded. He had taken quinine regularly: five grains every day. He had been playing football the evening before the present illness.



History of Present Illness.—No blood examination was made during the illness The patient recovered.

CASE 53.

A European Private Servant, aged 39 years.

Previous History.—The length of this patient's residence in West Africa, his previous tropical experience, his previous illnesses, his habits as regards the taking of quinine, and his movements shortly before his last illness were unknown.

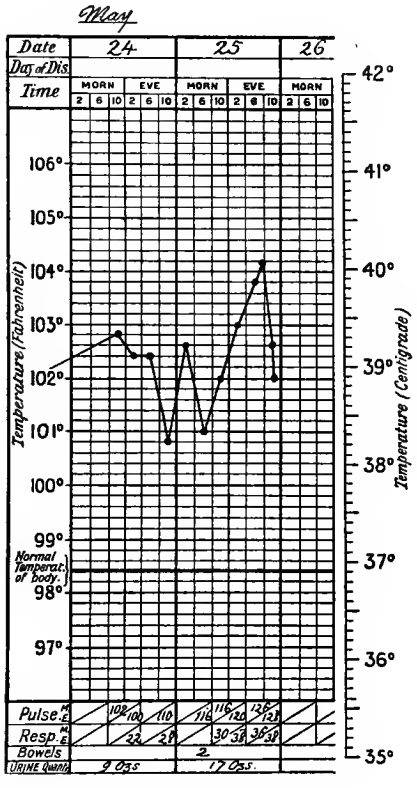
Present Illness.—There are no records of this patient's illness. He died on the 26th of May.

No Post-mortem Examination was made.

CASE 54.

An Engineer living in Bathurst, aged 24 years, employed by one of the Trading Firms.

Previous History.—He had been residing in West Africa for the seven months previous to his illness. He had no previous tropical experience. He had been to sea, but not in the tropics. He had no illness in West Africa. He had been in the habit of taking five grains of quinine regularly every day. He had not been away from Bathurst for some time before his present illness.



History of Present Illness.—No blood examination was made during his illness. The patient died on May 26th.

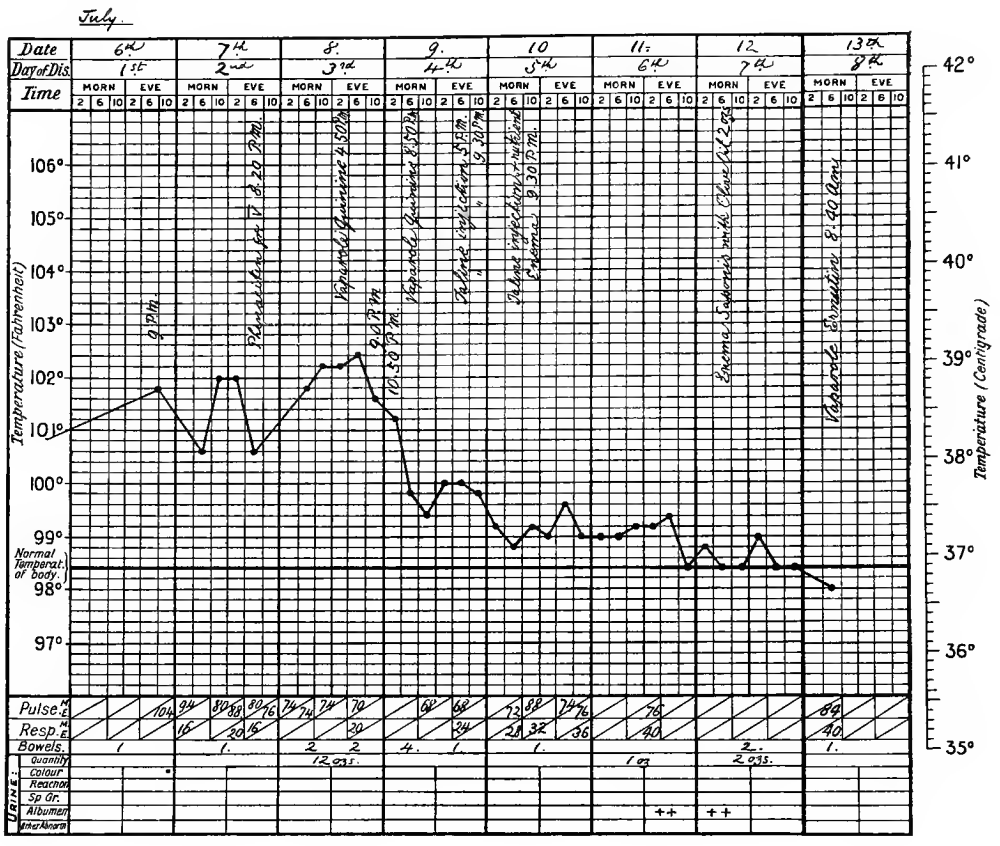
No Post-mortem Examination was made.

CASE 55.

AN ENGINEER EMPLOYED ON THE VESSELS IN THE HARBOUR, AGED 30 YEARS.

Previous History.—He had been three years in Bathurst. He had, however, had a period of leave in England after each year's service. He had no previous tropical experience and his habits as regards quinine prophylaxis were not known. He had been residing in Bathurst and had not been away for some time before the present illness.

Previous Illnesses.—Fever in September, 1909, three days; biliousness, November, 1909, five days. None recorded since 1909.



History of Present Illness.—The present illness commenced on July 6th, when at 3.0 in the afternoon the patient reported that he had a temperature of 101°. He took some quinine and was brought into hospital in the evening. On admission his temperature was 101·8°, and the pulse rate 104 beats to the minute. He did not complain of headache or any other special symptoms. His skin was fairly moist and there was no sign of vomiting. He was given pil. hydrarg. grs. VIII. He was also given milk and "Sauerbrünnen" to drink. During the night the bowels were moved.

On July 7th, at 6.30 a.m., he was given mistura alba 2 oz.; shortly after, he was given a cup of tea which he vomited. His bowels were again opened, the stools being very bilious in character. At 8 a.m. he was given quinine grs. x. At 9.30 a.m. he vomited a large quantity of light yellow bile. He was then given ice to suck and remained quiet until 1.0 o'clock, when he vomited more bile. At this time his temperature was 102°. During the afternoon he vomited continually and refused all nourishment. The temperature was still 102°, and the pulse rate 94 to the minute. He was given phenacetin grs. v, and some milk and Sauerbrünnen which he did not retain. The vomiting continued during the night. So far the vomited matter and the stools were bilious in character and the temperature had not varied very much. He complained of sleeplessness and was given a sleeping draught, which, however, gave him little relief.

During the morning of July 8th he took some liquid nourishment, but as this was nearly always returned he was, at 10 a.m., put on a mixture containing bismuth and soda, which he retained for a short time; the temperature was 102·2°. At 2 p.m. he had calomel grs. III, and as the vomiting still continued a mustard plaster was applied to his stomach. He was very restless at this stage and his tongue was furred and dry; he was also perspiring a good deal and complained of pain over the stomach. He was given quinine grs. v intramuscularly at 4.50 p.m. Soon after this the bowels were moved twice; the stools were yellowish, but darker than those passed previously. At 6 p.m. he was put on Sternberg's mixture and his bowels were again moved. For the first time since his admission the patient

now slept for a short time. At 7 p.m. he attempted to vomit, and was given another dose of Sternberg's mixture, after which he dozed or slept till 8.30 p.m.

During the night he was much calmer; he took small quantities of liquid, and, although he several times attempted to vomit, brought up nothing; the temperature at 10.55 p.m. was 101·2°.

On July 9th, at 6 a.m., the temperature had fallen to 99·8°; the respirations were 16, and the pulse 80, to the minute. The vomiting had ceased for the time being. The Sternberg's mixture was continued, and at 9.30 he was given some bovril, which was retained. At 10.30 he vomited a little, and at 10.40 he was given some brandy in iced soda-water which he retained; the temperature was 99·4°; the pulse 76 to the minute. Twice before 3 o'clock he vomited, though he retained most of the nourishment given. He had passed no urine since 6 p.m. on the 8th; consequently he was given a saline enema at 5 p.m. From then until 9 p.m. he took his nourishment well and had no vomiting. At 9.30 p.m. he was given another saline enema. He was fairly quiet until 12.20 a.m., when he vomited a little, and he slept occasionally until 6 a.m., when he vomited clear fluid.

July 10th. He passed this day in much the same manner as the previous one. At 6 a.m. the temperature was 98·8°; pulse 70; respirations 20. He made continual efforts to vomit, and complained of severe pain in the stomach and want of sleep. A hot fomentation, and afterwards a hot-water bottle, gave him some relief. As he still passed no urine another saline enema was given and dry-cupping was commenced. During this day he took nourishment in small amounts and drank a good deal of water and Sauerbrünnen. At 3.45 p.m. he was sponged over with tepid water and took a little iced champagne. During the afternoon he slept a little and was quiet until 9 o'clock, having had no vomiting. He was now given one ounce of barley water, which was returned in a few minutes. At 10 p.m. his temperature was 99°, the pulse 68 to the minute, and he was perspiring freely. During the night he drank several ounces of plain water and some milk and barley water, and had very little vomiting.

On July 11th, at 6 a.m., his temperature was still 99°; the pulse 68 to the minute; the respirations 24. He took a fair amount of nourishment until 11.30. a.m., when he vomited a quantity of black vomit. He seemed much relieved after this and took a little brandy in soda-water which he retained. At 2 p.m. he passed about one ounce of urine, which was loaded with albumen. He continued dozing during the afternoon, with intervals of attempted vomiting; he once went to stool, but there was no motion. He was now beginning to become exhausted from continuous efforts at vomiting and inability to take much nourishment. He retained a good deal of iced water, but refused milk or bovril. He complained now of "lightness in the head" and wanted to get out of bed. At 9 p.m. he had another vomiting attack and brought up some more black vomit. He was now very restless and refused his medicine.

On July 12th, at 5 a.m., he vomited black vomit, but retained a tumblerful of Sauerbrünnen given at 6 a.m. He passed two ounces of urine, which was still full of albumen. At 8.25 he had another attack of vomiting and again another at 1 p.m. His mouth and tongue were very coated and sore, and he had great difficulty in swallowing. At 4 p.m. his temperature was 99°; the pulse 76; the respirations 36. Very severe hiccough now appeared. Kidneys and bowels had not acted for twelve hours. At 6.20 p.m. he had an enema of soap and water containing about two ounces of olive oil, and he sipped two ounces of tea. At 7 p.m. he vomited, the vomit being a reddish colour—unaltered blood; the bowels were moved twice, the motions being liquid and black. At 8.30 p.m. he had another attack of hiccoughing and was very restless. At 10 p.m. he vomited a large quantity of blood, red in colour and undigested. Hiccough again appeared, but was relieved by a teaspoonful of vinegar. At 10.20 p.m. the temperature was 98·4°; pulse 62; respirations 40. From now onwards till 6 a.m. he vomited continuously, but managed to swallow small quantities of soda-water, iced water, and occasional doses of brandy.

On July 13th, at 6 a.m., his temperature was 98°; pulse 84; respirations 40. The bowels were moved, the motions consisting of black coagulated blood. He also passed a little urine. At 8.40 a.m. he was given, by hypodermic injection, a vaporole of ernutine. At 8.55 he again vomited red blood. At 10 a.m. the temperature was 97·6°. He was now almost unable to swallow. He tried a small quantity of egg and brandy, but could not keep it down, and vomited more blood. From now until the patient died at 6.45 p.m. he only managed to suck ice and drink a small quantity of water. The vomiting was continuous throughout the day, the quantity vomited being considerable on each occasion and had changed in character from a coffee-ground vomit to large reddish-brown coagula. He was conscious until the end, and only once complained of "lightness in the head."

From the third day of the illness the kidneys never acted, except to excrete an ounce or two of urine.

Post-mortem Examination.—No record.

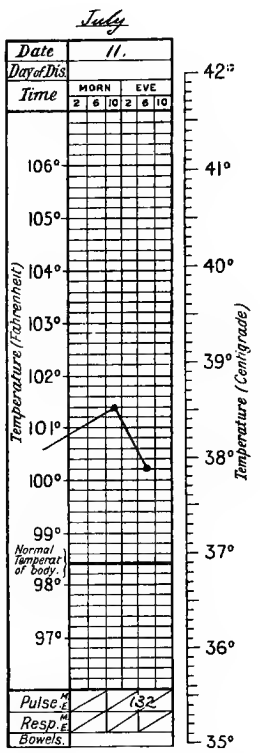
Laboratory Report.*—Stomach. Nothing abnormal detected.

* By permission of the London School of Tropical Medicine.

CASE 56.

A Syrian Trader living in Bathurst, aged 26 years.

Previous History.—The length of this patient's residence in West Africa, his previous tropical experience, his movements shortly before the present illness, and his habits as regards the prophylactic use of quinine were unknown. He had fever two or three days before the present illness.



History of Present Illness.—There is no record of a blood examination having been made. He died on July 12th.

Post-mortem Examination.—The liver was large and fatty.
The stomach contained black fluid; its mucous membrane was ulcerated.
The suprarenal glands were fatty.

Laboratory Report.*

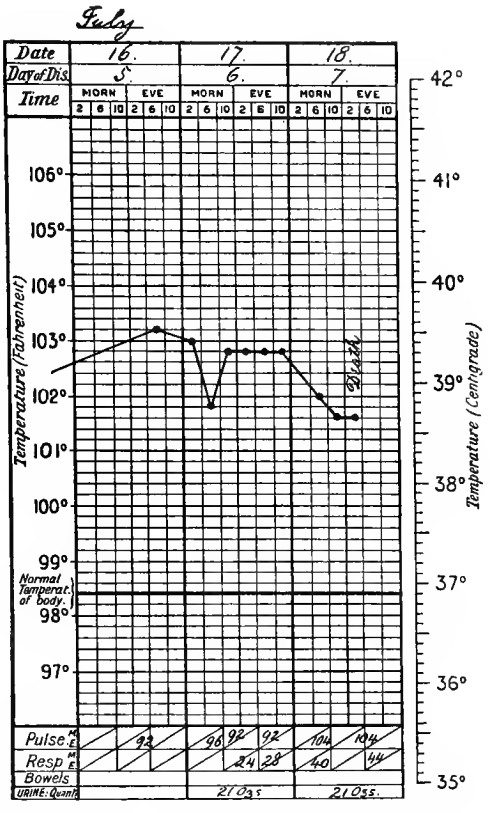
Spleen.—Marked congestion. No parasites or melanin seen.
Liver.—Marked fatty degeneration, very similar to that observed in Cases 50 and 51. Some necrosis of cells.
Kidney.—Marked congestion, slight degeneration in renal epithelium.

* By permission of the London School of Tropical Medicine.

CASE 57.

A CLERK, EMPLOYED BY ONE OF THE TRADING FIRMS IN BATHURST, AGED 27 YEARS.

Previous History.—He had been in West Africa for four years. His previous tropical experience was not known. He had "used quinine from time to time." His duties took the patient to Half-Die on or about the 11th of July; he may have been infected at this place.



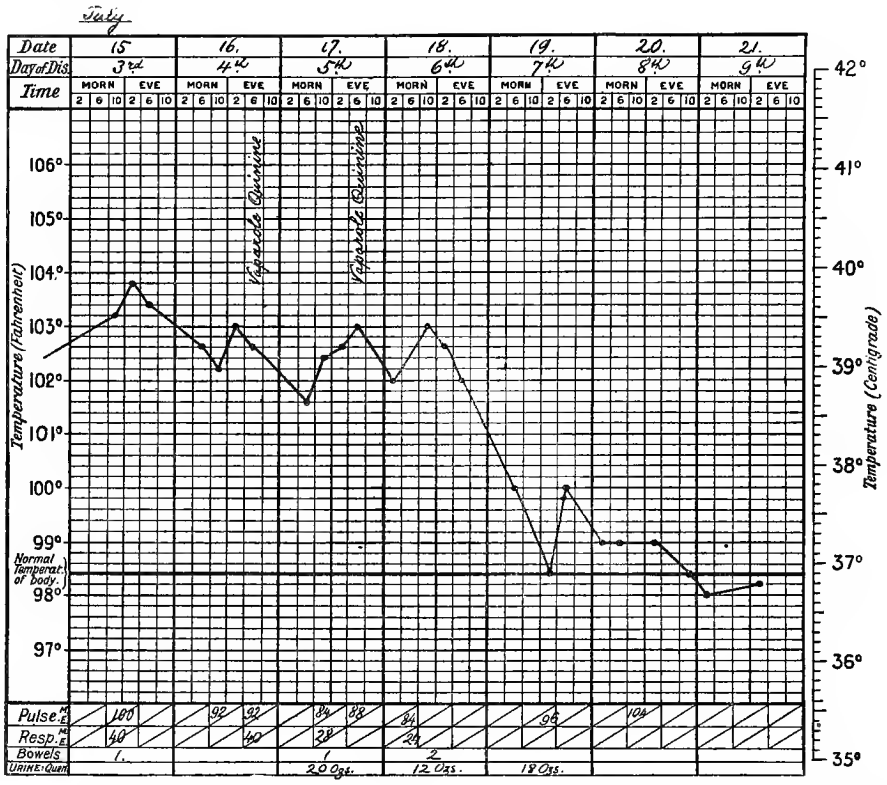
History of Present Illness.—There is no record of a blood examination having been made during the patient's illness. He died on July 18th.

No Post-mortem Examination was made.

CASE 58.

A Syrian Trader, aged 21 years.

Previous History.—The previous tropical experience of this patient, the length of his residence in West Africa, his previous illnesses, his habits as regards quinine prophylaxis, and his movements immediately before the present illness were all unknown.



History of Present Illness.—No blood examination was made during the patient's illness. He recovered and was discharged from hospital at his own request on July 24th.

CASE 59.

A Roman Catholic Missionary, aged 28 years.

Previous History.—He had been resident in Bathurst for the last two years. He had no previous tropical experience. He had taken quinine regularly two or three times a week Previous illnesses; "in France always sick." One or two slight attacks of malarial fever in Bathurst.

History of Present Illness.—He had been very restless, being deeply impressed by the deaths from Yellow Fever, and was very much afraid. He cycled from Bathurst to Abuko, a distance of about twelve miles, and arrived rather sick and faint; he took a purgative and the next day felt better, but complained of headache and nausea. He continued in this condition from Wednesday to Saturday afternoon. A doctor was sent for that night, but he died before the doctor had reached him on July 23rd at 6.30 a.m.

In this case the temperature was not recorded and no blood examination was possible.

No post-mortem examination was made.

CASE 60.

A Clerk, in the employ of one of the Trading Firms in Bathurst, aged 29 years.

Previous History.—He had been in West Africa eight months. He had no previous tropical experience. Previous illnesses: loss of appetite; three days in bed with headache. He had never had fever. He had taken quinine from time to time. He lived in the same house as Case 57, whom he nursed in the earlier part of his illness.

History of Present Illness.—No blood examination was made.

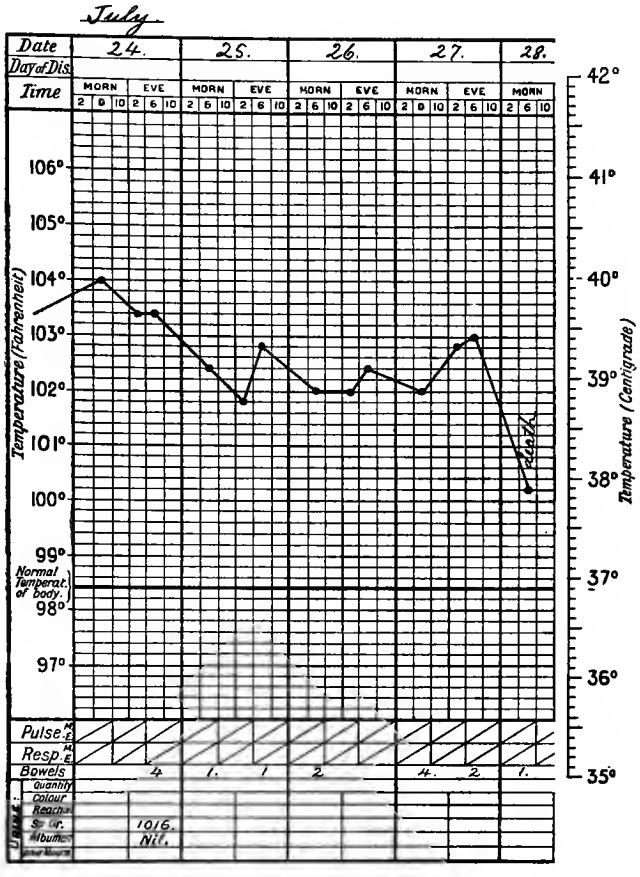
The patient was delirious before he died on July 23rd. He was under treatment from July 22nd.

Post-mortem Examination.—Not made.

CASE 61.

A Syrian Trader, aged 23 years.

Previous History.—His previous tropical experience, apart from West Africa, the length of his residence in West Africa, his previous illnesses, and his habits as regards quinine prophylaxis were unknown.



History of Present Illness.—He lived in the same house as that occupied by Case 54.

No blood examination was made during his illness.

Post-mortem Examination.—The heart and lungs were normal. The heart weighed 13 oz.

The liver weighed 4 lb., was intensely yellow; "the yellowest I have ever seen."

The stomach contained a large amount of black fluid, "typical coffee-ground," and its mucous membrane was red and inflamed.

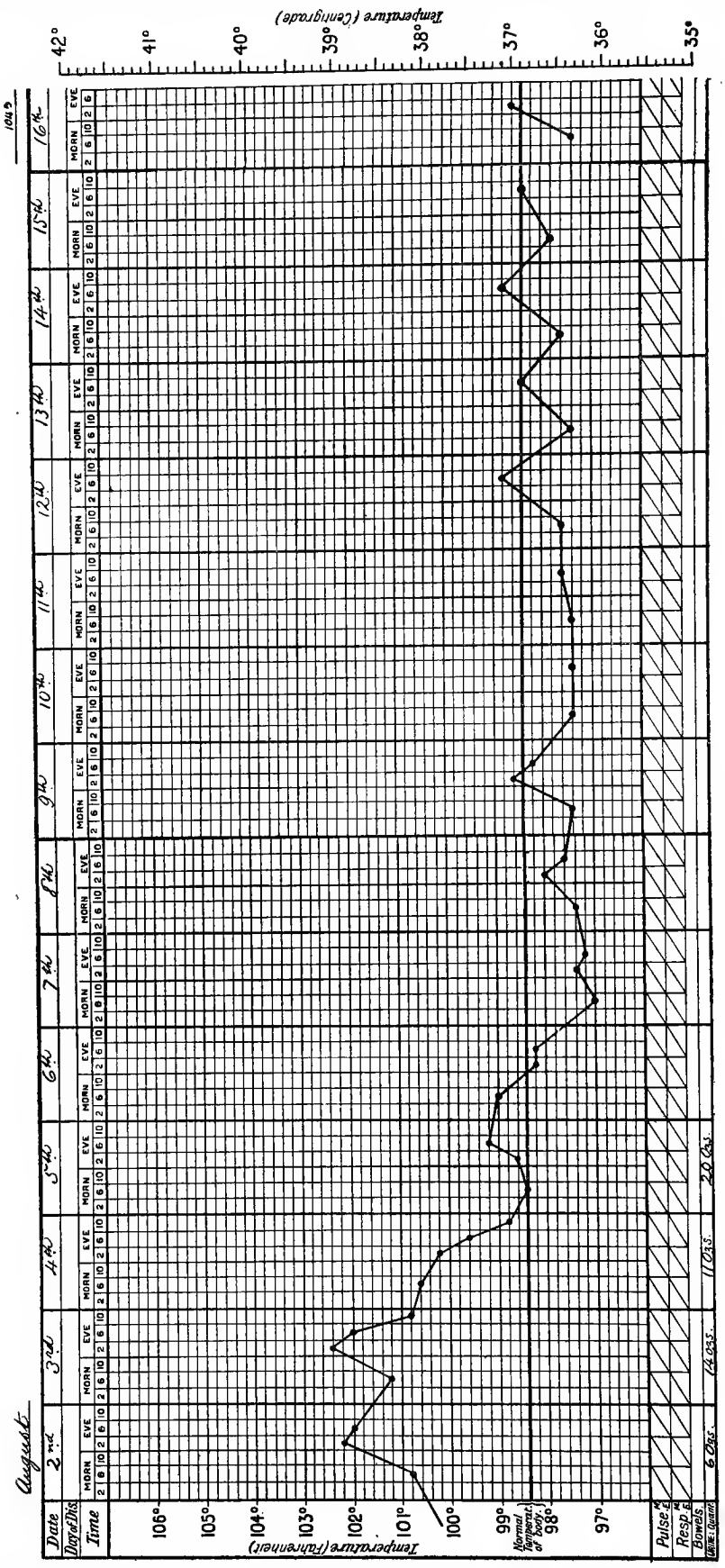
The spleen weighed 9 oz., was enlarged and congested, but not hard.

The kidneys weighed 9 oz. each and were enlarged and full of blood.

The suprarenal capsules: only one was found, merely a yellow mass of fat.

CASE 62.

A Clerk, aged 25 years, employed by one of the Trading Firms.



Previous History.—He had resided in West Africa for three and a half years. His habits as regards quinine prophylaxis were to take five grains of the drug when feeling

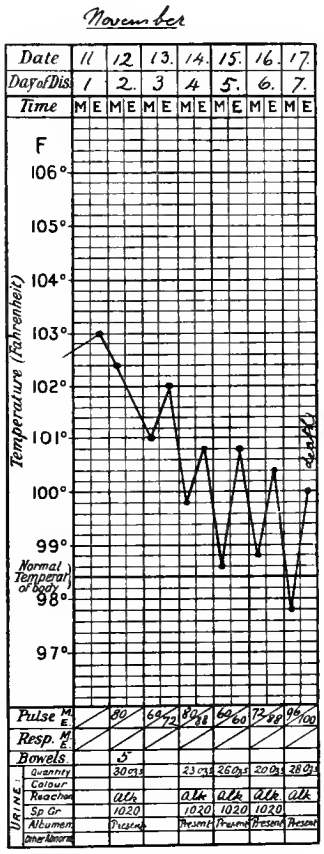
"seedy." His movements in the Colony shortly before the attack are described as "irregular." He was subject to constipation.

History of Present Illness.—No blood examination was made during the patient's illness. There is no further record beyond that shewn in the chart opposite.

CASE 63.

A Clerk, aged 27 years.

Previous History.—He returned from France a month before his illness, after leave of absence, having done two year's service in the Colony before. While in France he had stomach trouble. Nine days before the present illness he had a vomiting attack, for which, however, he did not seek advice. He took quinine regularly during his first tour, but had only taken it when feeling "seedy" this tour. He suffered from chronic constipation.



History of Present Illness.—He was first seen on November 11th. His temperature was then 103°. There was no headache, but he was suffering from continuous vomiting. The vomit did not contain any blood or black matter. There was a history of exposure to a very hot sun for an hour and a half without a helmet and the patient was thought to be suffering from Sun Fever. During the night he vomited a little pure blood and very suspicious-looking coffee-ground-like material.

On the morning of the 12th he was admitted to hospital. On admission his temperature was 102·4°; pulse 80. There was continuous vomiting, the vomit consisting of coffee-ground material and also some large black flakes. A blue pill was administered and retained; a dose of white mixture was also retained. The bowels were opened five times. The case was reported as very suspicious of Yellow Fever. Vomiting became continuous; not even a few drops of iced water could be retained.

A mixture consisting of—

Tinct Iodi.	...	...	...	...	m. III
Acid Carbolic Pur.	...	...	...	...	m. II
Aq. Chloroformi	...	...	...	...	oz. II

was given and retained.

Thirty ounces of urine were passed ; its specific gravity was 1020, it was alkaline, and contained a small quantity of albumen. The vomit, which was like coffee-grounds, was also alkaline.

On November 13th the temperature fell to 101°, but rose again to 102°. The pulse, at first 60 beats per minute, rose to 72. Benger's food and strong chicken broth were administered per rectum and retained. Saline injections were also given and they seemed to relieve the patient. The fæces were at first very black, but changed to a bilious colour. Nothing abnormal was found in the blood. The vomiting still continued, sometimes containing a little pure blood, but as a rule it was of coffee-ground material.

As he had not slept for three days, a hypodermic of morphia was given and he slept for twelve hours, during which time he did not vomit.

On November 14th the morning temperature was 99·8° ; pulse 80. The vomiting again returned ; he could not even retain a small quantity of iced water.

A mixture containing :—

Bismuth carbonate	gr.	x
Acid Hydrocyan. Dil.	m.	v
Aqua Chloroformi	oz.	i

was tried and the first dose was retained, but it seemed to do very little good, for the vomiting soon returned. During the whole time nutrient enemata were given and retained. Twenty-three ounces of urine were passed during the twenty-four hours. It was alkaline in reaction ; its specific gravity was 1020 ; the albumen had increased in quantity. The evening temperature was 100·8° ; the pulse rate 88.

On November 15th the morning temperature was 98·6° ; the pulse rate 60. His condition remained the same, but the vomit became more bilious. The evening temperature was 100·8° ; the pulse rate 60. Twenty-six ounces of urine were passed in the twenty-four hours ; it was alkaline in reaction ; its specific gravity was 1020 ; the quantity of albumen had much increased. Severe vomiting of coffee-grounds occurred during the night. Nutrient and saline enemata were given.

On November 16th, the morning temperature was 98·8° ; the pulse rate 72. In the evening the temperature was 100·4°, the pulse rate 88.

On November 17th, the morning temperature was 97·8°, the pulse rate 96. Very severe vomiting of " coffee-grounds " occurred in the morning ; the vomit was still alkaline. At 9 a.m. a hypodermic injection of morphia was given. He slept during the day and retained nutrient enemata. The evening temperature was 100°, the pulse rate 100. He did not vomit again until 8 p.m., when his condition became very serious. The pulse became rapid and compressible. A hypodermic injection of strychnine was given, but he gradually sank and died about midnight. Twenty-eight ounces of albuminous urine, of alkaline reaction, were passed during the last twenty-four hours of the patient's life.

Post-mortem Examination.—The liver was yellow in colour, and nearly all fatty ; only small islands of liver tissue remained.

The stomach contained a large quantity of coffee-ground material.

The kidneys were congested and weighed 7 oz.

The spleen was congested and weighed 7 oz.

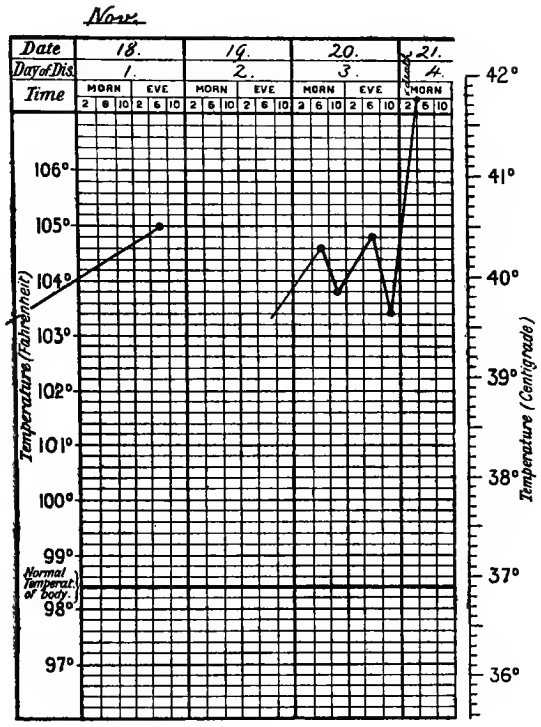
The heart was congested, very anæmic aud fatty.

The other organs were normal.

A definite diagnosis of Yellow Fever was only arrived at after the post-mortem examination.

CASE 64.

Previous History.—Not recorded.



History of Present Illness.—On November the 15th he was seen by two medical officers, who both decided that the case was one of Malarial Fever.

On November the 18th the news of the death of his friend (Case 63) from Yellow Fever very profoundly affected this patient. He became extremely nervous, and his temperature rose to 105°. All efforts to pacify him being unavailing, he was removed to hospital on the 20th. The temperature on admission was 104·6°. Later it dropped to 103·8°; he took his quinine and nourishment. In the evening the temperature rose to 104·8°; at 11 p.m. the temperature was 103·4°.

On the morning of the 21st his temperature rose suddenly to 107·2°, at 5.20 a.m., when he collapsed and died.

This case was considered to be one of Pernicious Malaria, complicated by depression and fear.

Post-mortem Findings.—The stomach shewed no signs of black vomit.

The liver was not fatty.

The spleen and kidneys were all congested.

Laboratory Report.—Malaria pigment was found miscroscopically in a smear preparation from the spleen.

SYNOPSIS OF THE CASES.*

The Onset was sudden in Cases 9, 12, 23, 24, 25, 31, 33, 35; gradual in Cases 1, 6, 8, 10, 16; accompanied by rigors in Cases 1, 6, 9, 10; accompanied by chills in Case 17; accompanied by yawning and stretching in Case 8; accompanied by high fever in Cases 23, 24, 25, 31, 33.

The Fever: Faget's sign§ was noted in Cases 10, 18, 41, 42, 45, 46, 47, 52, 55, 63; it was absent in Cases 19, 20, 21.

The Fever, as shewn in the temperature charts, may be classified into the following types; descending type in Cases 6, 13, 25, 35, 45, 52; intermitting type in Cases 1, 12, 17, 18, 19; remitting type in Cases 9, 10, 15, 21, 22, 24, 30, 32, 40, 54, 63; continued type in Cases 8, 23, 26, 27, 31, 33, 36, 42, 46, 50, 51, 55, 57, 58, 61. In the following Cases insufficient data make classification impossible, namely, in Cases 5, 11, 20, 41, 48, 56, 62.

The Face was flushed in Cases 6, 10, 16, 25, 27, 30, 31, 50; "puffy" in Case 21.

The Eyes were injected in Cases 5, 10, 17, 24, 25, 27, 30, 31, 41, 42; they are described as "bright" in Cases 5, 6, 10, 26, 27, 30; as "watery" in Cases 25, 26, 30, 31. They were jaundiced in Cases 5, 8, 10, 11, 12, 15, 16, 19, 21, 22, 23, 25, 31, 35, 37, 41, 42, 43; painful in Cases 24, 33; swollen in Case 31. Photophobia was noted in Cases 1, 24, 32, 33.

The Pupils, late in Cases 20, 37, were dilated and not reactive to light; they were dilated but reactive to light in Case 37; the conjunctival reflex was abolished late in Case 37.

The Skin: Jaundice is noted in Cases 1, 3, 5, 6, 8, 10, 11, 12, 13, 16, 19, 21, 22, 23, 25, 26, 30, 31, 32, 33, 35, 39, 41; a rash in Cases 17 (accompanied by pruritus), 13; in Case 6, the skin was yellowish red, almost the colour of brawn; in Case 41 there were buccal spots on the floor of the mouth; in Case 42 there was "suffusion" round the ears. Petechial hæmorrhages occurred in the area affected by the rash in Case 31.

The Nervous System.

Cerebral Symptoms: Restlessness is noted in Cases 1, 3, 5, 8, 9, 10, 12, 15, 20, 21, 23, 24, 27, 30, 31, 33, 41, 42, 47, 49, 50, 51, 55; mental distress in Cases 1, 8, 9, 10, 12, 13, 50; mental excitement in Cases 30, 31, 42; there was diminution of mental activity in Cases 3, 20, 31, 32, 37, 39, 51; a feeling of cheerfulness and comfort is noted in Case 32; feelings of prostration in Cases 23, 25, 26; Case 55 complained of feeling light-headed; delirium is noted in Cases 5, 8, 10, 15, 21, 26, 27, 30, 33, 35, 42, 47, 48, 51, 60; insomnia in Cases 8, 35, 55; coma-vigil in Case 8; coma is noted at the end in Cases 8, 9, 12, 35, 39, 47, 48, 49; convulsions at the end in 15, 24, 27, 30; stertorous breathing in Case 48; Cheyne-Stokes respiration in Case 42.

Disorders of Sensation: Thirst is noted in Cases 8, 17; hunger in Cases 42, 51; a bad taste in the mouth was complained of by Case 23; deafness is noted in Cases 23, 32, 49.

Pain: Headache is noted in Cases 6, 9, 10, 17, 18, 20, 22, 23, 24, 25, 26, 27, 31, 32, 33, 35, 36, 41, 42, 46, 47, 50, 51, 59; in Cases 6, 9, 10, 17, 24, 25, 31, 33, 41, 42 this symptom was severe; pain in the eyes and photophobia have already been noted under eyes; pain is noted over the spleen in Case 1; over the liver in Cases 15, 16; over the stomach in Case 55; in the abdomen in Cases 16, 19, 38; in the lateral thoracic regions in Case 19; in the loins in Cases 6, 41, 42, 45, 48; in the back in Cases 15, 19; in the chest in Case 15; in the limbs in Cases 13, 27; in the joints in Case 19; in the legs in Cases 17, 42, 51; all over the body in Case 20. Abdominal tenderness and rigidity is noted in Cases 8, 13, 18, 19, 21, 22, 41; griping pains in the stomach are noted in Case 8; Hyperæsthesia of the skin is noted in Case 42.

Twitching and involuntary muscular movements of the muscles of face and neck occurred in Case 9; of the neck in Case 9; of the calf muscles in Case 10; of the mouth in Cases 25, 31; of the hands in Cases 25, 31; of the lower jaw in Case 42; of the legs in Case 22; of the arms in Case 22; nystagmus was noted in Cases 22, 37; extreme tonic spasms lasting for the three hours immediately before death occurred in Case 12; cramping pains in the arms and legs were noted in Case 13.

The Digestive System.

The Mouth: Fœtor of the breath was noted in Cases 6, 8, 9, 38; hæmorrhage from the mouth was noted in Cases 3, 38, 42; the mouth was excoriated in Case 50, coated and sore in Case 55; buccal spots were noted in Case 41.

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* Case 64 is not included.

§ A want of co-ordination between pulse rate and temperature, shewing a falling pulse rate with a rising or horizontal temperature.

The Tongue was furred in Cases 6, 8, 9, 10, 15, 16, 17, 21, 22, 23, 24, 27, 30, 31, 39, 41, 50, 51, 55; clean at the edges in Cases 6, 10, 17, 24, 27, 30; excoriated in Cases 38, 50, 55; fissured in Case 9.

The Nose and Throat: Epistaxis occurred in Cases 3, 6.

The Stomach: Nausea occurred in Cases 10, 17; retching was a prominent symptom in Case 55; vomiting is noted in Cases 15, 16, 22; bilious vomiting in Cases 1, 10, 49, 55; "black vomit" in Cases 1, 3, 5, 6, 9, 10, 12, 13, 20, 21, 23, 24, 25, 26, 27, 30, 31, 32, 33, 35, 37, 38, 41, 49, 50, 51, 55, 63; hiccough occurred at the end in Cases 10, 25, 31, 35, 37, 55; eructations in Cases 41, 42.

The Stools: Constipation is noted in Cases 39, 50; diarrhœa in Cases 13, 22; the stools were foul in Cases 9, 10; malæna and hæmorrhage from the lower bowel occurred in Cases 3, 32, 38, 41, 42, 50, 51, 55. The motions were pale in Cases 23, 24, 26, 33, 42.

The Liver was enlarged in Cases 12, 16, 21, 27, 31; not enlarged in Case 51; small in Case 39; tender in Cases 16, 19, 21, 31; in Case 21, however, there was a history of C_2H_6O.

The Circulatory System, Blood and Ductless Glands.

Heart failure was noted in Cases 6, 27, 32, 33, 37, 38, 41, 48, 51; there was some cardiac distress in Case 9.

The Pulse (see also Faget's sign under Fever) was slow in Cases 6, 8, 15, 17, 18, 42, 43, 44, 45; rapid in Case 38.

The Blood was examined microscopically for malaria parasites in Cases 1, 3, 5, 6, 8, 9, 11, 12, 13, 17, 21, 37, 39, 42, 43, 44, 45, 46, 50, 51; malaria parasites were found in Cases 1, 51; the result was doubtful in Case 21; the bodies described by Seidelin were not found in Case 50; there was no mononuclear increase in Cases 3, 9; a mononuclear increase was noted in Case 12; the blood counts made in Cases 41, 42, 43, 44, 45, 46 are here shown:—

	Case 41.	Case 42.		Case 43.	Case 44.	Case 45.		Case 46.
Polymorphs ...	82·25	86·07	74·50	71·00	67·25	71·00	67·25	77·00
Large mononuclears	4·00	4·70	5·75	6·25	5·00	6·25	5·00	6·00
Lymphocytes...	12·00	7·64	12·00	17·00	24·00	17·00	24·00	11·75
Eosinophiles ...	0·50	0·19	1·25	4·25	4·25	4·00	2·75	0·50
Transitionals...	1·25	0·76	6·25	1·50	0·25	1·50	0·25	4·75
Mast cells ...	—	0·38	0·25	—	1·75	—	1·75	—
	100·00	99·74	100·00	100·00	102·50	99·75	101·00	100·00
Malaria Parasites	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
Pigmented mononuclears	—	—	—	Nil.	Nil.	—	—	Nil.

The Spleen was enlarged in Case 1.

The Renal System.

Urine: The quantity was diminished in Cases 6, 12, 13, 17, 24, 25, 27, 30, 31, 32, 33, 35, 37, 38, 55; suppression occurred in Cases 9, 12, 25, 27, 31, 33, 36, 37, 49; the colour was high in Cases 15, 17; red in Case 12; dark in Cases 8, 11; the reaction was acid in Cases 6, 8. Albumen: Albuminuria was noted in Cases 6, 8, 9, 10, 12, 13, 15, 16, 21, 24, 25, 26, 27, 30, 31, 32, 35, 41, 42, 44, 45, 50, 55; there was no albuminuria in Cases 24, 33, 36, 47. At first no albuminuria, later, a trace, and towards the end the passage of a small quantity of a highly albuminous urine was noted in Cases 9, 12, 31, 42, 50. A temporary albuminuria is noted in Cases 16, 17, 23, 44, 45; the urine was loaded with albumen in Cases 6, 8, 10, 12, 13, 15, 41, 55; Biliuria was noted in Cases 6, 11, 13, 15; hæmaturia in Case 19; uræmia caused death in Case 41.

The Respiratory System.

Dyspnœa was noted in Cases 9, 21, 51; Cheyne-Stokes respiration occurred in Case 42; there was congestion of the lungs in Case 6; there was dulness on percussion over the base of the left lung accompanied by diminished air entry and mucous râles in Case 38.

POST-MORTEM EXAMINATIONS.

General view of the Body.

Jaundice was noted in Cases 6, 8, 9, 10, 12, 13, 21, 24, 26, 28, 29, 30, 31, 34, 35, 36, 41, 42, 46, 47, 50, 51; localised jaundice in Cases 35, 41, 46, 47. In Cases 12, 22, 24 the jaundice deepened after death. Jaundice was absent in Case 48. There was hypostatic congestion in Cases 6, 8, 9, 13, 41, 42, 46, 48; Cyanosis is noted in Cases 21, 31; Ecchymoses are noted in Cases 10, 35; petechiæ in Cases 26, 30, 31.

The Nervous System.

Œdema of the Pia arachnoid is noted over the frontal area in Case 6; the brain and meninges were congested and hæmorrhages were found on the surface of Cerebrum and Cerebellum in Case 48. The brain was slightly œdematous in Case 37; congested in Case 20.

The Circulatory System.

Hæmorrhages were noted into the skin, 10, 26, 30, 31, 35; into the Cerebrum and Cerebellum in Case 48; sub-pericardial Case 8; into the heart-wall Cases 38, 48; sub-peritoneal Cases 10, 26, 29; around the gall bladder 31, 46; into the ovaries Case 34; into the stomach or stomach walls in Cases 6, 8, 9, 10, 12, 13, 15, 20, 21, 26, 28, 29, 31, 34, 35, 37, 38, 41, 42, 46, 48, 49, 50, 51, 56, 61, 63 (though in Case 37 the contents were negative to the Guiacum blood test); into the walls of the small intestines Cases 38, 49; into the peritoneum and walls of the large intestine Case 38; into the kidneys in Cases 20, 26, 28, 29, 30, 31, 35, 42, 46, 49.

The Pericardium contained an excess of fluid in Case 8; the fluid contents were deeply stained in Case 10.

The Heart.—The heart was normal in Cases 46, 61; the aortic valves were diseased in Case 48; the heart muscle was friable in Cases 6, 22; the heart was fatty Cases 6, 22, 31, 63; the right chambers were enlarged and infiltrated with fat in Case 22; the right auricle was distended in Cases 50, 51; the heart was much enlarged in Case 51; was much congested and very anæmic in Case 63.

Ductless Glands.

The Spleen was enlarged in Cases 10, 12, 22, 26, 27, 28, 29, 30, 31, 34, 35, 38, 41, 46, 47, 61; soft in Cases 8, 10, 22, 30, 42, 47, 48, 49; almost diffluent in Cases 6, 48; firm in Cases 12, 21, 29, 37, 38, 41; congested in Cases 10, 12, 21, 31, 35, 37, 46, 51, 61, 63; dark in Cases 22, 35, 36, 42, 47, 48. The splenic capsule was thickened in Cases 28, 29; adherent in Case 29.

The supra-renal capsules were normal in Cases 50, 51; had undergone fatty degeneration in Cases 56, 61.

The lymphatic glands were normal in Cases 50, 51.

The Digestive System.

The Stomach: Hæmorrhages have already been noted. Congested capillaries were noted in Cases 6, 8, 9, 15, 21, 29, 31, 34, 37; the mucous membrane was swollen in Cases 9, 10, 26, 29, 42, 51; was inflamed in Cases 47, 50 and 51; there was ulceration of its mucous membrane in Case 56; old ulcers were found in Case 51. The rugæ were injected in Case 48; extraordinarily marked in Case 49. There was a growth at the pyloric end in Case 36; the stomach was hour-glass shaped and dilated in Case 51.

The Small Intestine was inflamed in Case 51; contained black matter similar to that in the stomach in Cases 6, 8, 9, 10, 12, 20, 26, 28, 29, 30, 31, 34, 35, 38, 50, 51; the veins and capillaries were injected in patches in Cases 10, 22, 47, 48; Peyer's patches were well marked in Case 51.

The Large Intestine: The contents were acid in Case 8; were of a light colour in Cases 8, 22; were of a dark colour in Case 51.

The Appendix was inflamed in Case 37.

The Liver was enlarged in Cases 6, 22, 26, 28, 29, 30, 31, 34, 36, 46, 47, 56; fatty in Cases 6, 10, 26, 30, 34, 35, 37, 51, 56, 63; (fatty degeneration was doubtful in Cases 28, 29, 35, 38, 49); not fatty in Case 50; congested in Cases 9, 21, 26; showed commencing cirrhosis in Case 21; bloodless in Case 34; retracted under the costal margin in Case 10; of a yellow colour in Cases 6, 8, 10, 15, 26, 28, 29, 30, 31, 34, 35, 36, 37, 42, 46, 48, 51, 56, 63; pale in Cases 13, 49. Nutmeg liver is noted in Cases 12, 22, 31, 35, 41. Its consistence was firm in Cases 42, 47, 48; tough in Case 30; it was friable in Cases 10, 12; the peritoneum stripped readily in Cases 10, 22.

The Gall Bladder was normal in Case 41; thickened in Case 42; empty in Case 51; contained grumous gall in Case 47.

The Pancreas was enlarged in Case 22; deeply stained in Cases 31, 46; normal in Cases 50, 51; large and fibrous in Case 47.

The Genito-Urinary System.

The Kidneys were enlarged in Cases 8, 36, 38, 42, 46, 49, 61; congested in Cases 6, 8, 12, 20, 21, 35, 37, 38, 46, 50, 51, 63; normal in Case 41; hard and fibrous in Case 47; engorged with blood in Cases 35, 48, 61; their capsules stripped readily in Cases 26, 28, 30, 35, 46, 47, 48; were adherent in Case 41. A sub-capsular renal cyst was found in Case 48.

The Bladder contained albuminous urine in Cases 48, 49; non-albuminous in Case 47; bile-stained urine in Cases 22, 31; dark non-albuminous urine in Case 47; a urine which deposited columnar epithelium in Case 48.

The Ovaries: There were hæmorrhages into both ovaries in Case 34.

The Uterus and Fallopian Tubes were enlarged, swollen, and congested in Case 34.

The Respiratory System.

The Lungs were congested in Cases 6, 31, 48; healthy in Cases 8, 22, 34, 36, 42, 46, 61; there was hypostatic congestion in Cases 28, 31, 48; they were collapsed in Cases 50, 51; œdema was noted in Cases 20, 37; emphysema in Case 12; an increase of fibrous tissue in Case 47. Consolidation was found in Case 37; pneumonic patches in Case 38.

The Pleuræ were healthy in Case 22; there were old adhesions in Cases 36, 50.

LABORATORY REPORTS.

The records of blood examinations have already been considered.

The Brain: Smears from the brain shewed nothing abnormal in Cases 47, 48.

The Stomach: Smears from the wall shewed nothing abnormal in Case 48; sections of the wall shewed no abnormality in Cases 51, 55. The stomach contents were: broken down blood corpuscles, fibrin, diplococci in sheaths, large and small streptococci, bacilli, and sarcinæ in Case 38, altered blood, fat globules and crystals in Case 51.

The Liver: Smears from the liver shewed no abnormality in Cases 41, 47, 48. Cloudy swelling of the cells in the portal zone associated with indistinct nuclei and the breaking down of some of the cells next seen in Case 37; cloudy swelling of the cells and pigment were seen in Case 38; fatty degeneration of cells and fatty infiltration associated with necrosis and injection of the portal veins were seen in Cases 51, 56.

The Pancreas was normal in Case 51.

The Heart: Smears shewed nothing abnormal in Case 47; the heart muscle was normal in Case 51.

The Spleen was normal in Case 37; smears shewed nothing abnormal in Cases 41, 47, 48; cocci in groups and chains, bacilli, rod shaped and some in chains were seen in Case 38; great congestion, an increase in fibrous tissue, and an absence of malaria parasites were found in Cases 51, 52, 56; no melanin was seen in Case 56.

The suprarenal glands were normal in Case 51.

The Kidneys: Nothing abnormal was seen in smears from the kidneys in Case 41; cloudy swelling was noted in Cases 37, 51, 52; degeneration of the cells lining the tubules was seen in Cases 51, 56; the collecting cells were filled with granular débris in Case 37; the kidneys were congested in Cases 52, 56.

The patient's serum was tested for the Widal reaction with negative result in Case 9.

APPENDIX A.*

Gazetted 11th June, 1910. Regulation No. 4 of 1910.

REGULATIONS FOR THE PREVENTION OF THE SPREAD OF YELLOW FEVER MADE IN PURSUANCE OF SECTION 57 OF THE PUBLIC HEALTH ORDINANCE, 1905.

Whereas by Section 57 of the Public Health Ordinance, 1905 (No. 15 of 1905), the Governor in Council may from time to time make such regulations as to the said Council may seem fit with a view to preventing the spread of yellow fever as well on the seas, rivers, and waters of the Colony and on the high seas within three miles of the coasts thereof as on land and may declare by what authority or authorities such regulations shall be enforced and executed.

And whereas yellow fever exists in the Port of Freetown:

Now therefore, in pursuance of the said section, it is hereby ordered as follows:—

1. Masters of ships shall anchor at not less than 1,000 yards from the shore.

2. (*a*) Masters, Pursers or Agents of ships which do not carry a Surgeon or Doctor shall not book any passengers from Freetown without permit signed by the Colonial Secretary.

(*b*) The Ship's Doctor or Surgeon shall test the temperature of all intending passengers.

(*c*) Intending passengers, whose temperatures are not normal or who show suspicious symptoms, shall not be permitted to travel by the ship.

3. No transit passengers shall be permitted to leave a ship. No visitors shall be allowed to board a ship.

4. No communication shall take place between the ship and shore before 6 a.m. and all such communication shall cease at 6 p.m.

5. No poultry or bundles of clothes are to be shipped.

6. Lighters and steam launches shall be kept free from mosquitoes and from water in which the latter can breed, and owners or persons in charge of the same shall permit such lighters and steam launches to be examined daily.

7. The agent of the Coaling Company and all shippers shall cause the temperature of labourers engaged to coal or handle cargo to be tested, and no labourer whose temperature is not normal shall be allowed to leave the shore.

8. No Tally Clerk, Customs Officer, Army Service Corps Official, or Post Office Official shall board or be allowed to board a ship unless he produces a certificate or permit from the Colonial Medical Department or from a Medical Officer of the Royal Army Medical Corps to the effect that his temperature has been tested that day and has been found to be normal.

9. The Harbour Master shall enforce and execute these regulations, and in this work shall be assisted by the Harbour Police.

10. The Harbour Master shall forthwith report to the Colonial Secretary any case in which the foregoing regulations are not complied with.

11. If any person shall wilfully neglect or refuse to obey or carry out or shall obstruct the execution of any of these regulations, he shall be liable, on summary conviction, to a penalty not exceeding fifty pounds or to imprisonment, with or without hard labour, for a period not exceeding six months.

12. These regulations shall apply to the Port of Freetown.

Made and passed by the Governor in Council this 30th day of May, 1910.

APPENDIX B.*

EXTRACTS FROM SIR RUBERT BOYCE'S INTERIM REPORT ON THE FREETOWN EPIDEMIC.

Since my arrival in Freetown I have made it my business to examine personally as many houses and yards as time would permit. The districts which I have examined have been representative of the poorest, small shopkeeper, trader, and better residential classes in Freetown. Altogether I have examined 200 houses and yards. The number of houses in which larvæ were found was 88. This gives a percentage of 44. In very many houses larvæ were found in more than one receptacle; thus, in the 200 houses, larvæ were found 174 times. The receptacles in which larvæ were found include barrels, lilypots, upturned bottles used for edging gardens, half-broken bottles placed on party walls, and empty discarded tins and old water receptacles.

The total number and kind of receptacles examined in the 200 houses was barrels, 87; wells, 27; buckets, 144; earthen pots, 50; tins, 66; stone jars, 17; odd receptacles, 121.

What is the Mosquito of Freetown?—In the above house-to-house examination the larvæ almost invariably found during my visit (July-August) were those of the *Stegomyia fasciata*. I was unable to find in any of the receptacles examined larvæ of Anophelines. I may mention that, with the one exception of the Grass Fields district, the yards were remarkably free from earth puddles, although the rainy season was at its height.

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* See page 9.

The very striking feature of the well nigh universal presence of the Stegomyia was that the larvæ were found breeding in the smallest collections of water. A teaspoonful of water in some discarded tin, husk, shell, bottle or calabash was sufficient to harbour several larvæ. It must also be borne in mind that my investigations were carried on after the same districts had been gone over by the sanitary inspectors, and innumerable articles removed, and also after many summonses had been inflicted for breeding larvæ. So that the condition prior to 1910 must have been infinitely worse. Furthermore, the introduction of a fine pipe water supply in the year 1905 must have greatly contributed to reduce storage vessels of all kinds, and we must assume that before the year 1905 Freetown must have been a hot-bed of Stegomyia. Little wonder then that those were the days of great yellow fever epidemics. They were the days when Sierra Leone justly earned its reputation of the "White Man's Grave."

From the above fact that the Stegomyia is by far the most common mosquito of the houses of Freetown, as indeed it is of a very large proportion of the coast towns of West Africa, it follows that the prevalent disease will be that carried by the Stegomyia. From this I am forced to the conclusion that yellow fever is endemic in Freetown, and that it has existed all along in a mild form such as is constantly met with in yellow fever endemic countries.

The Start of the Outbreak.—Of much interest and significance was the fact that the yellow fever first appeared amongst the Syrian tribes of Freetown. These people are not natives; they were in all probability non-immune. They lived in the crowded portion of the town, where, if our preceding remarks prove correct, one would expect to find endemic, chronic, or so-called "ambulatory" yellow fever passing unobserved among the Creoles. Owing to the fact that the Syrians were non-immune, that the carrier—the Stegomyia—existed in abundance, and that the source of infection, the Creole, was living in the immediate vicinity, the disease promptly seized the Syrian, and yellow fever was made obvious. On the other hand the Europeans living in less crowded quarters, and for the most part protected by nets, at night time at least, were not the first attacked. But why, it may be asked, were not more whites attacked, as in the 1894, 1837 and 1823 outbreaks? The answer is, in my opinion, that in the interval the white traders and officials have learnt the importance of anti-mosquito measures; they sleep more systematically under nets, their houses are not in the crowded poorer parts of the town, and they contain less stagnant water holders, or articles likely to facilitate the breeding of the mosquito. These are all factors which must lessen the risks of infection by the mosquito.

Prophylaxis and Recommendations.—In the first place I desire to pay a tribute to the Senior Sanitary Officer, Dr. Kennan, upon whom fell the brunt of the anti-yellow fever operations. Owing to his efforts the outbreak has remained confined and the suggestions which I now offer are the result of my observations here on the spot, and of observations made in many Colonies where I have made similar investigations, and I feel sure that the Senior Sanitary Officer, with myself, appreciates their importance and significance.

A. *Anti-Larvæ Measures.*—In the 1905 Health Ordinance, Clause 31, wise anti-mosquito recommendations were framed, but they do not appear to have been enforced, at any rate until quite recently. Examination of the clause 31, however, reveals at once that the essential point in mosquito prevention was omitted—the clause specified that any vessel *intended for the storage of water* must be protected. But it mostly happens that larvæ breed in vessels and receptacles not intended for water storage, such as waste pots and tins, bottles, &c., &c. In my opinion therefore the clause should either be amended or an anti-stagnant water ordinance introduced to make it an offence to have *stagnant water* on any premises, the presence of larvæ being taken as evidence of stagnant water.* I may mention that anti-stagnant ordinances are now the rule rather than the exception in countries liable to yellow fever. Furthermore, no great difficulty has been encountered in the working of the ordinance, and fines are regularly inflicted without any disturbance of public order.

In my opinion Freetown has everything in its favour in the matter of the prevention of the Stegomyia.

The problem has already been greatly solved by the very excellent pipe-borne water supply, which I understand will be still further augmented.

Therefore there is no hardship in reducing, abolishing, or effectively screening all water-barrels and large storage vessels.

There is no necessity for wells, which are always a menace to the public health, and I think they should at the earliest date be filled in, or failing that, oiled once a week.

Increased inspection of the yards ought to lead to the diminution of all odds and ends liable to hold water. In Freetown bottles on walls and around flower beds are constant offenders.

The "cabbage lily" vases are also offenders. I am confident that they can be remedied, for they are not a necessity. I am therefore of opinion that the task before the Senior Sanitary Officer is one that can be surmounted.

I do not think that puddles or rock pools in the vicinity of houses should be overlooked, for they undoubtedly may and do give rise to mosquito breeding. Therefore they should be dealt with provisionally by oiling, or permanently by filling in.

* I understand that such an ordinance is contemplated.—R.B.

Bush-clearing in Freetown.—In my opinion, next to anti-stagnant water measures stands bush-clearing. Freetown is much overgrown. The bush prevents evaporation, causes stagnation of the air, leads to the breeding of mosquitoes, forms an effective cover for all kinds of detrimental odds and ends and vermin, and the débris in the dry weather blocks drains and litters everything. In my opinion, Freetown would be far more healthy and ærated were a systematic attempt made to reduce the bush where it is obviously overgrown, and to remove it altogether from unoccupied compounds. It cannot be too strongly insisted upon that bush in tropical towns is the most efficient cloak to filth, ignorance, and carelessness that exists to-day. Light and air are the essential forces of hygiene.

In my opinion the sanitary inspectors are too few for a town of 60,000.

Educational Prophylaxis.—At the Protectorate school at Bo I saw one of the best and most practical methods of instructing the future generation in sanitation that I ever met with. I do trust that this excellent system will be extended, for boys trained in the schools will become the inspectors of the future.

Medical Organisation.—In my opinion, the services of your excellent officer, the Senior Sanitary Officer, could be still further utilised were it so arranged that his work could be arranged to permit him to devote all his energy and experience to the cause of preventive medicine, to be, in fact, the Sanitary Authority of the Colony and Protectorate, travelling from town to town, carrying out and personally supervising sanitary operations and available to advise upon sanitary administration. In my opinion, it is a disadvantage, except on rare emergencies, that the Senior Sanitary Officer should be called to undertake curative work such as is entailed in hospital administration. One man cannot do it; the cure of the sick is one thing, the prevention of disease is quite another matter. I am, however, strongly of opinion that every young doctor arriving on the coast should be made to realise that he is expected to take a share in preventive work, and to help, therefore, in cleaning up.

Quarantine Administration.—In my opinion, the quarantine arrangements at present in force require readjusting on the lines of the inter-colonial West Indian and Pan-American Quarantine Codes. Quarantine is a protective measure intended to hamper trade as little as possible, but it can only be truly administered if each contracting party has implicit reliance upon the health security of the other. For instance, it would be a matter of the greatest difficulty to enter into a practical quarantine agreement with a colony in which a quarantinable disease was endemic, or in which the Stegomyia swarmed in the chief seaport. Regulations under those conditions would be required to be too strict. The necessity of the contracting parties placing their towns in a position of absolute security, therefore, is the preliminary step to a humane and business-like quarantine measure.

R. B.

APPENDIX C.

REPORT BY DR. KENNAN ON A DISEASE CALLED "BAYLOO."

It affects both adults and children, but chiefly the latter. It is believed to be infectious through contagion conveyed by urine to persons passing over places where it has been passed on the ground or deposited. Cases arise "one one" (*i.e.*, singly, not in epidemics like small-pox). Its prevalence is most marked at the end of the dry season (and (?) the very early rains). The onset is sudden, with acute febrile symptoms and vomiting of yellow material, which may later be green, and the urine is described as "red," "dark," or brown. Prostration to a variable degree supervenes. In from four to seven days, or later, the "eyes" and finger tips under the nails become yellow, and the diagnosis is established; but it is not pretended that the diagnosis can be made till this yellowness appears, *i.e.*, the bilious vomit and "dark urine are not by themselves pathognomonic. Food is not desired in the early stages, and what may be taken is usually rejected. The disease has sometimes a fatal termination, but if treatment is early resorted to, recovery is the rule. The duration of illness varies from about ten days in children to perhaps a month or more in adults. Some difference of opinion in different places exists as to whether the same person can have the disease more than once. In some places, at least, it is recognised that yellowness alone (*i.e.*, without the acute symptoms having preceded it) does not justify the diagnosis of "bayloo." At no place was it described as the most prevalent disease, or the one which caused the greatest mortality. It was in each place believed to have been "always" in the country, and I could not find that any tradition exists regarding its first appearance. One narrator described it as a "god's sickness," which expression would fairly accurately describe the British matron's idea of measles, chicken-pox, or whooping cough in England.

4. The following notes are from notes taken at places where enquiry was chiefly made, but I may say that at every place "bayloo" was known and stated to exist from time to time.

Mano.—This place "enjoys" a bad sanitary reputation, and is at present "taboo" as a station for European foremen platelayers.

"Bayloo" commences suddenly with vertigo (the result of exposure to the sun) and weakness, with body heaviness and "fever." The urine is dark, of "red" colour; there is inability to "stomach food." The appearance of yellow colour may be delayed "weeks."

It may affect persons of any age. In 1904 young men from Freetown working at Mano on railway construction died from "bayloo." The green vomit may be followed by brown, but not blood. Some cases occurred at the end of the "dries," 1910. Those who are careless about treatment die. The narrator suffered as a small boy, and was treated with boiled palm cabbage water.

Baiima.—"Bayloo" exists in Baiima and all neighbourhoods, especially during "rains." Adults and children affected, but chiefly the latter. Fever, vomiting green, urine "red," eyes ' yellow," duration about seven to ten days, some die; probably could find four children in each town during the rains at any one time with "bayloo." Not considered contagious.

Segbwema.—Adults and children get "bayloo." About nine cases in town in last two years. Three cases sent recently to the "fakai." Onset sudden : fever, tired, vomit yellow, urine dark, eyes yellow after about three days, contagion by passing over infected urine on ground. The sickness "always" here (endemic). Understands that yellow eyes not always due "to bayloo," but if sudden fever onset, and eyes yellow in few days, it is "bayloo." Death may ensue in seven to fourteen days, but if treated recovers. Not recently introduced. Has seen a person walk about for a long time with yellow eyes, but did not think he had "bayloo." With another kind of "bayloo" blood may be passed per anum, but there is no preliminary fever.

Kasama.—A small town on the River Sewa. "Bayloo" occurs singly, chiefly amongst children; some die; duration seven to fourteen days; perhaps fatal months after. Fever onset, and yellow eyes and finger tips three or four days after, and they then know it is "bayloo." The vomit is yellow, and the urine dark red.

Pendembu.—Main line railhead. Many children get "bayloo," singly; some never get it; never epidemic; children do not die from it.

Upper Sama.—Paramount Chief's town, Lobu country.—"Bayloo" not infrequent, one by one, chiefly children, at end of "dries" (or (?) beginning of rains); some die if not treated; onset sudden; fever for few days, vomiting, then yellow eyes and finger tips, perhaps seven days after onset; urine dark early, vomit yellow. I was shown one boy, said to have had "bayloo" three years ago, now about 12 or 13 years old, and not robust, miserable looking. The duration is usually about 14 days, but patients may die months afterwards if not treated. No one gets "bayloo" twice, and it has always been in the country.

Sumbuya (Sumbuya, Matakong, and Mabungo), on the Big Bum River.—"Bayloo" cases frequent, about ten cases a year, more adults than children (?). Urine "red," eyes and finger tips yellow, belly may swell, may die if fever strong; occurs singly, some die, children seldom; yellowness appears in about seven days from onset; convalescence slow, about a month or even two. When illness first appears patient sent to "fakai."

Tikonko (Paramount Chief's town).—This is a relatively large town of about 210 houses seven miles from Bo. The account of "bayloo" was much the same as elsewhere, but it is believed persons may have it more than once; the Chief is dead, but the Acting Chief thinks he has himself had it twice.

The late Chief Sandi's son, aged about 25 years, says he had "bayloo" in Tikonko last November for first time, but had had fever many times. The onset was sudden with intense headache and photophobia; the urine was "red," vomit at first yellow then green for about three days; then eyes and finger tips (under nails) became yellow; constipation, and passed blood after purgative defæcation. No other known case of "bayloo" in Tikonko at the time. Pains in sides of abdomen, very tired and convalescence about 20 days. This man now looks healthy and intelligent, and was educated at the Albert Academy in Freetown.

The Court Messenger who accompanied me to Sumbuya from Bo told me he had "bayloo" when an adult in Freetown. He had high fever, and was delirious for some time. Illness lasted about 14 days, and jaundice about four days.

Corporal Karbunda, at Moa River Barracks, informed me that when a private at Bandajuma, he had "bayloo," and that he saw his father's "picken" (a young boy) with it at Dodo, near Kai Laun, two months ago when on leave at home. His own attack was marked by yellow and green vomit, yellow eyes, with duration about six days. He believed more children than adults get it; that some die; that it is never caught twice; than it is non-contagious; that it is a "god's sickness." He described "kolavulay" as fever with ague, vertigo, and vomiting, but no jaundice, and thinks it less often fatal than "bayloo."

I have not, so far, been able to make enquiry in Timne country, but I understand from information obtained from some Timnes that they know "bayloo" in their country under the name "bonkie"; and they describe it in almost identical terms with those given by such of the Mendis as I have been able to question.

I hope to have an opportunity at an early date of pursuing the investigation in Timne country and other places.

I have used the word "bayloo" throughout, but what I take to be modifications of this name are also heard, such as "wayloo," "burra," &c., to describe the same disease.

R. H. K.

[271466]

MEMORANDUM ON "BAYLOO" BY DR. COLLETT.

With reference to the Senior Sanitary Officer's interesting remarks on "bayloo," I trust I may be allowed to state that I recognise the disease—I had almost said as an old friend—from Southern Nigeria. I have not infrequently met with the group of symptoms and sequelæ described in Dr. Kennau's paper, during the last nine years or so of my service on the Coast; and I believe that before we can arrive at any trustworthy conclusions, greater care must be exercised in sifting the native evidence on the subject. I am of opinion that there are at present insufficient grounds for considering the affection a modified occurrence of yellow fever, or indeed, accepting that the conditions are even a disease *sui generis*.

2. With the Effik people of the Calabar District "bayloo" is known as "*Uto Enyin*," "yellow eye." I had also collected the name and symptoms amongst the Ibo, Ijah, the Bonny, and the Brass and New Calabar people, and the Yorubas; but I cannot place my hands on these notes at the moment. The term "yellow fever" is the general phrase by which the more or less Europeanised natives denote this same so-called disease.

3. I agree with Dr. Kennan that the morbid condition (*i.e.*, the train of symptoms described) is an entity; but what the *causc* is, and what its relations are to the very grave question of yellow fever none of us are agreed upon. The supervention of jaundice in the course of an acute febrile disease is a matter of fairly frequent occurrence with the native of West Africa; it is the correct ætiology of this combination that we are principally concerned with.

4. A certain proportion of these cases are, in my opinion, simply malarial infections where the tendency is towards the gastric type, in which, as is well known, there is more or less pronounced nausea with jaundice. The severity of the disease varies between wide limits.

5. Another small percentage of cases described as bayloo, uto enyin, iba or yellow fever, proves, when the opportunity occurs for a medical officer to see them, to be other well-known and well-marked diseases such as gastric catarrh, obstructive jaundice, liver troubles, and (I have a case in mind) even pneumonia.

6. Again, the promiscuous use of native bush medicines, if they are not actually responsible for the jaundice in some of these cases, assists, I believe, in its production. Enemata of paw-paw and cocoa leaves, decoctions and injections from the leaves, bark, roots, and fruits of plants of the *Apocynaceæ*, *Loganiaceæ*, and *Euphorbiaceæ* orders, are, I know, used, and cannot, I think, be without some effects on the gastro-intestinal system.

7. Yet another fact of interest in this connection is, as I have observed in Southern Nigeria at least, many natives who are suffering from an acute disease are in the habit of treating themselves with a drug bought from an European factory at the district headquarters. One popular remedy is "vomit medicine"—tartarate of antimony, another is santonine. Both drugs are fashionable with the Nigerian native and the "foreign" Sierra Leonian and Accra-man. All take them in any dose, at any time, and for any complaint. May not some of these cases of jaundice be induced by such heroic treatment?

8. In conclusion, however, I must say that I do not wish to preclude the possibility of the existence of a separate disease or its connection with yellow fever in "bayloo." The possible occurrence of what has been described as "epidemic or infective jaundice"—a disease first called attention to by Professor Weil of Heidelberg in 1886—on the West Coast should not be lost sight of. The disease is endemic in parts of Turkey, Egypt, Malta, Greece, and in Asia. The ailment is as yet ill-defined in medical literature; but it would appear to be an acute infection characterised by fever, jaundice, enlargement of the liver and spleen, with nephritic and nervous symptoms.

J. W. C.

APPENDIX D.

PRELIMINARY REPORT by Sir Rubert Boyce to His Excellency the Governor of the Gold Coast upon the subject of Yellow Fever and Cognate Sanitary Matters based upon data collected during his visit to the Colony, June and July, 1910.

GOVERNMENT HOUSE, ACCRA,
18*th July*, 1910.

SIR,

I have the honour and great pleasure of submitting to you, on the eve of my departure, a short preliminary report on my findings in the Colony since my arrival. It is my intention to leave the complete report over until I shall have visited other adjacent Colonies in West Africa, and am in a position to report fully under the question of yellow fever in West Africa as regards its history, ætiology, symptomatology, pathology, treatment, and prophylaxis.

I have arranged my findings and conclusions under the following six heads:—

(1) The yellow fever situation in Seccondee upon my arrival, the steps taken, &c., &c.

(2) The state of defence of the other principal towns in the Colony as regards yellow fever, Stegomyia surveys, &c.

(3) The origin of the yellow fever epidemic. The history of yellow fever in the Gold Coast and in adjacent Colonies.

(4) Necessity for intercolonial and international quarantine regulations in West Africa.

(5) Health administration and health conditions existing at the moment in mining centres in the Colony in view of present and future threatened invasion by disease.

(6) The directions in which, in my opinion, future sanitary improvements might be carried out in the Colony, in the order of their urgency respectively.

(7) Certain recommendations.

(1) The yellow fever situation in Seccondee and the steps which had been taken to stamp out the disease.

Diagnosis.—From analysis of the symptoms of the patient during life, and examination of the organs after death (shown to me by the medical officer), I agree fully with the findings of the medical officer, Dr. Ralph, that the cases reported as yellow fever could not have been anything but yellow fever.

New arrivals.—The cases diagnosed as yellow fever were, for the most part, "new arrivals," that is, that *on this trip* they had only been in the town for periods varying from a few days to a few months. They were not residents who were either born or reared or had spent years at Seccondee.

Size of epidemic.—It is always exceedingly difficult to ascertain the size of an epidemic. The well-marked cases are easily recognised and diagnosed, but mild cases are invariably overlooked.

In every probability there were mild cases amongst the native population which passed unrecognised.

Declaration of yellow fever.—Very great praise is due to all medical officers concerned for the very prompt manner in which the disease was diagnosed and declared. Their action stands out all the more strikingly in view of the past history of the disease in the Colony.

Origin of epidemic.—See paragraph 3. In paragraph 3 I refer to the question of endemic yellow fever. I have, however, also examined the possibility of infection having been introduced into the Colony from without. In my opinion it is possible that infection might have been introduced from without; but in my opinion the endemic theory is also sufficient to explain the outbreak.

Prophylaxis.—If proof were needed of the wisdom of the creation of the post of Senior Sanitary Officer it has been fully demonstrated by the recent outbreak. Having had myself considerable experience in anti-yellow fever measures in many countries, I heartily congratulate the Colony in possessing in the present Senior Sanitary Officer an officer who proved by the rapidity and success with which he grappled with the epidemic that he was a most efficient officer. With all the measures which he put in force I thoroughly agree. They have all proved successful, and the epidemic was promptly brought to a standstill. Had not the situation been promptly dealt with, and the three bed-rock measures of defence been carried out with exactitude, viz., segregation and removal of the non-immune white population, fumigation, and larvæ destruction, there is every reason to believe that the disease would have extended locally, and spread to the mines and other towns of the Colony, as there is reason to believe did actually occur in the past history of the Colony.

Stegomyia survey.—There is every reason to believe that at the outbreak of yellow fever in Seccondee, every compound was breeding stegomyia larvæ, in other words, that the percentage of this pest was 100. During my visit to the town, I made it my business to examine representative parts of the town, and in a total of 842 houses visited either by myself or by the special medical officers told off for the purpose, larvæ were found 165 times, which works out at under 20 per cent. In the business area of the town the percentage was actually under 1 per cent.

(2) State of defence of the other towns in the Colony.

Having satisfied myself of the state of yellow fever security in Seccondee, I at once, with the co-operation of Dr. Rice, sent a circular telegram to the Senior Medical Officers of Coomassie, Obuassie, Tarquah, Axim, Cape Coast, Saltpond, Kwitta, Winneba, Addah, Accra, asking

(1) A return showing the number of houses and yards in which stegomyia larvæ had been found.

(2) The nature and approximate number of water-holding receptacles in each case.

(3) Reports or traditions of cases of yellow fever.

(4) Nature and extent of any anti-larvæ measures carried out, such as removal of odd receptacles, screening, oiling, bush clearing, and fish stocking.

The replies obtained were most instructive, and showed that the common mosquito of these centres was the stegomyia, or yellow fever mosquito.

That although a certain amount of stegomyia destruction had been carried out, yet that the percentage was very high, and constituted a source of grave anxiety.

In consequence of this, I visited, with Dr. Rice, Tarquah, Obuassie, Coomassie, Cape

Coast, and Accra, and by personally inspecting yards, I arrived at the extent of the breeding places of the stegomyia, and satisfied myself that the percentage was exceedingly high.

In consequence of this high percentage, the medical staff of many of the places was reinforced, and increased activity was shown in larvæ destruction.

There is no doubt that far greater attention will have to be paid in future to the destruction of stegomyia larvæ in all these centres.

(3) The origin of the yellow fever. Its history in this and in adjacent Colonies.

In seeking the origin of a disease like yellow fever, the first question to be investigated is whether the carrier of this disease, viz., the stegomyia, is present in the Colony in sufficient numbers? The answer is definite and affirmative. The stegomyia is par excellence *the common* mosquito of a large number of the important industrial centres of the Colony. Therefore the carrier is present, and probably has been present from early times.

Yellow fever has been described as endemic on the Guinea Coast, but so far I have not been able to obtain precise data. In adjacent Colonies we know that it has often been signalled in the past, and from the history of the disease in the West Indies there is some support for the view that yellow fever was introduced there from West Africa under the name of "bulam fever" in the slavery days when intercourse was more frequent. Therefore, there is nothing improbable historically in the view that yellow fever may have been endemic in this Colony. But does analysis of the causes of sickness in this Colony throw any light upon the endemic origin of this disease? To my mind it does. Examination of the case books of the various colonial hospitals and of the annual medical and sanitary reports of the Colony shows that yellow fever in the past has been often diagnosed and even officially reported. In my opinion the case books furnish evidence that yellow fever has been a prevalent disease in the Colony, but as often happened in the past it has been confused with the sister so-called "miasmatic" disease, that is malaria, so that in very many instances cases of yellow fever were diagnosed as varieties of malaria under the headings of "intermittent," "remittent," "bilious remittent," pernicious," "gastric," &c., malarial fevers.

Should this surmise prove correct, a new light will have been thrown upon the "malaria" of West Africa, and it may turn out that a reason why the malaria of West Africa appeared so deadly was because included in it was the disease which is now known as yellow fever. In this connection it must always be remembered that a precisely similar mistake was made in the West Indies and on the Spanish Main, where the two diseases – malaria and yellow fever—were for long confounded together.

Should it prove that yellow fever has all along been endemic amongst the natives of this Colony—and it must be remembered that the abundant distribution of the stegomyia supports the view—then we can understand why now at the commercial unfolding of the Colony—at a time when a considerable number of non-immunes have collected together—the disease declares itself, as has been the case on countless occasions, in the so-called yellow fever zone.

Examination of the annual medical reports of the Colony shows that yellow fever is stated to have occurred in the years 1895, 1897, 1902. Examination of the hospital case books shows that yellow fever was diagnosed as such in

Cape Coast in 1902, 1903, and 1897.
Saltpond in 1897 and 1902.
Elmina in 1895.
Accra in 1899.

But in addition the case books furnish evidence of the very frequent, if not *continuous occurrence*, of yellow fever at Cape Coast, Saltpond, Elmina, Accra, Axim and Quittah.

In addition a very suspicious outbreak of disease occurred at Mantraim in 1902 which might well have been yellow fever. This suspected occurrence of yellow fever in the mining centres is especially significant. We know that the stegomyia exists there at the present time in abundance, and experience in Central and South America demonstrates the ease with which mining centres are attacked with yellow fever.

(4) Intercolonial and international West African quarantine measures.

The existence of yellow fever having been proved both in this and in other British West African Colonies, as well as in the French and German Colonies, there can no longer be any reason for not bringing about a wise intercolonial and international quarantine law respecting this disease, similar to the one adopted in the West Indies. Such an ordinance would facilitate trade, stimulate the cleaning up of towns, and in every way promote the welfare of the Colony.

(5) Health administration and conditions existing in mining centres.

The history of tropical Colonies has from time to time again demonstrated the extreme vulnerability of mining centres. Not only do large non-immune bodies of workmen accumulate, for the most part unacclimatized, but different nationalities are brought together, and the universal experience is that they bring together the diseases peculiar to their respective countries.

Unfortunately, experience has over and over again demonstrated the proverbial carelessness and recklessness of miners, and unfortunately the companies themselves have too often neglected to make proper provision for their men, and have chosen without due care and selection medical officers of very inferior training and experience. For these reasons, and

also from my personal examination of mining villages at Tarquah and Obuassie, and their comparison with adjacent villages, I would advise their careful supervision by the Sanitary Department of the Colony. In my opinion the Senior Sanitary Officer and his officers will always be in a far better position to make a diagnosis of, say, yellow fever, plague, cholera, or ankylostomiasis than, say, a mining doctor, and would naturally far more clearly appreciate the importance of such diseases to the well being of the Colony than a doctor solely entrusted with the care of miners. In short, in my opinion, the closer the sanitary administration of the mines is linked up with that of the Colony the better for the mines and the Colony as a whole.

In the meantime, I think that influence should be employed to induce the companies to select their officers with far greater care, and with due regard to the modern developments of sanitary science and epidemiology.

(6) Lines of advance in sanitation in the Colony. Without entering into details the experience which I have gained, both by personal examination of local conditions and by intercourse with the medical men of the Colony, prompts me to suggest certain well-known lines of sanitary advance taken in order of urgency :—

(1) Segregation of the whites, *i.e.*, of the non-immunes.

(2) Carrying out of the proposed water schemes. Provisional safeguarding of the present unsatisfactory supplies. Unceasing supervision of the water supplies and water receptacles, &c. ; in other words *by every means to prevent the breeding of the stegomyia.*

(3) Sanitary inspection. Redoubling the energy in this direction, and procuring at once better trained men. Systematic training of the men.

(4) Improved and increased latrine facilities. The construction in sea ports of tidal water latrines and washing places for pans.

(5) The proceeding with drainage schemes, and their acceleration by the use of the sand pump wherever applicable.

(6) Villages and towns to be in future more carefully planned. In present congested areas houses to be removed when they show signs of tottering. There are a vast number of half-fallen-in houses in many villages and towns which could at once be removed, to the great advantage of the Colony.

(7) Increased educational propagandism by means of lectures, &c.

(8) To bear in mind that now, on the eve of the commercial rise of the Colony, is the time, by wise prophylaxis, to eradicate yellow fever and to keep out plague and ankylostomiasis and to diminish guinea worm, malaria, and the other diseases.

Recommendations.—In conclusion, I beg to suggest that at the present time the following appear to me to be the sanitary needs of urgency :—

Vigorous anti-larvæ measures in all centres ; far more vigorous than at present carried out. Much greater activity in removing odd water-holding receptacles in all congested centres. Far greater provision for the removal of rubbish than exists to-day, which now too often is allowed to litter yards and streets. More carts are urgently needed. More cheap incinerators are urgently needed. More activity is necessary in removing tottering and dilapidated houses. These are now to be met with in almost every village and town, and their immediate removal would bring about a great improvement at little cost.

That the Senior Sanitary Officer be constantly on the move, and exhorting those under him that as they have a stake in the prosperity of the country they must be prepared for hard and vigorous work. That finally, as it is not usually possible to accomplish everything, the aim should be to do well some small but definite piece of sanitary reform, and to be able to say, " something accomplished, something done."

R. B.

APPENDIX E.

THE BARQUES "MORGENGRY" AND "KOSMOS."

The following extracts from the report of the District Supervisor of Customs at Seccondee bear out the suggestion that the disease was brought over-sea to West Africa :—

Barque "Morgengry."—The barque "Morgengry" arrived in port here on the 17th of January last laden with timber from Gulf Port, Mississippi, consigned to Messrs. F. & A. Swanzy, Limited. The vessel was boarded in the usual way and given pratique, the master having produced a clean bill of health to the boarding officer. Later during the same day the master came to the Customs House to enter his ship, and in answer to questions I put to him stated that the voyage lasted 75 days, that the health on board his ship was good throughout the voyage, but that he had encountered very bad weather, through which a part of his deck cargo was lost overboard. The master noted a protest of this loss, and at his request I made an endorsement of the fact in his log book. After the necessary papers were filled up he entered his vessel, and his declaration was made and signed before me.

The next day the master of the "Morgengry" came to my office and reported to me that he had received a cable informing him of the death of his wife, whom he left ill with

fever in hospital in Gulf Port. In relating the circumstances which led to her death the master said that she had sailed with him for Gulf Port shortly after their marriage; that during their stay in Gulf Port, whilst the ship was being laden and near the date of sailing, she contracted fever, and as she was no better on the date he had to sail, he was compelled to take her to hospital, where he left her. He did not inform me of the type of the fever she suffered from. The "Morgengry" left this port for Pensacola on the 7th March last.

Barque "Kosmos."—The barque "Kosmos" arrived in port here on the 5th March last laden with timber from Mobile, U.S.A., consigned to Messrs. the Gold Coast Machinery and Trading Company, Limited. This vessel was entered in the usual way, and the master answered the same questions as those put to the master of the "Morgengry." The voyage lasted 45 days, good weather was experienced throughout, and the health was good. The master stated that he had nothing further to report, and at his request I endorsed his log book accordingly. The "Kosmos" sailed from this port for Barbados on 10th April last.

Case 23 went alongside the ship ("Kosmos") once, but was never on board, and the captain visited the bungalow occupied by Cases 23 and 24.

APPENDIX F.

DR. WALKER'S REPORT ON THE SANITARY MEASURES TAKEN AT ACCRA, 1911.

5 p.m.—The Principal Medical Officer, the Senior Sanitary Officer, the Medical Officers and the Medical Officer of Health, all Sanitary Staff, and Commissioner of Police assembled at the Basel Mission factory.

The residents in the factory were dealt with as follows:—Europeans isolated in empty Basel Mission houses at Christiansborg; clerks and trolley boys who did not live on the premises were kept under observation in their own houses at Christiansborg.

A medical officer was detailed to examine both the Europeans and natives twice daily, to take their temperatures, etc., isolating those who showed any sign of illness.

The native employees resident, consisting of 72 kroo-boys, were taken under escort to Riponsville, and there isolated under guard.

By 7 p.m. the factory had been emptied of all persons belonging thereto, and fumigation of the residential block (the patients admitted came from this block) was on the way and was completed at 2 a.m.

24th May.—An area was declared an infected area (*vide* Orders in Council of the 26th May).

On the evening of the 24th this area had been, as far as was practicable, closed for disinfection.

The Europeans living in this area were removed to, and isolated in, the Government day school, which was closed to provide the accommodation. (This school is a new building and is situated well away from the town.)

Native Employees.—There were 14 kroo-boys living in Messrs. Fischer & Co.'s yard, which abuts on the yard of the Basel Mission factory, and 35 kroo-boys living in a shed attached to the African Association building. These were all isolated in a camp constructed that day by the Public Works Department at Adabraka.

These two isolation camps at Riponsville and Adabraka were visited twice daily by a medical officer detailed for that duty.

25th-31st May.—The agents of the various firms, excepting Basel Mission factory (which was dealt with entirely by the Sanitary Department) gave their help in rendering their premises air-tight and ready for fumigation by the sanitary authorities. On the Europeans reporting their factory sealed, their premises were visited by the Acting Senior Sanitary Officer, the Medical Officer of Health, and European Sanitary Inspector, and, when defects in sealing were remedied to their satisfaction, the places were fumigated.

Native Quarters in the Infected Area.—All houses in this area structurally capable of being treated on the same lines as those of the Europeans were so treated.

In this area there are a number of hovels inhabited by natives which it is impossible to render healthy. These are being demolished. The inhabitants are being housed in a selected area as rapidly as the Public Works Department can erect accommodation for them.

N.B.—The aim of the sanitary authorities is to find housing accommodation for all persons whose shelters are being demolished.

Isolation Hospital.—A mosquito-proof yellow fever isolation hospital, with the necessary dispenser's quarters and outbuildings, has been erected beyond the small-pox isolation camp (which camp is at present vacant). There are separate buildings here to which medical officers send doubtful cases for observation.

June 1st.—All European factories (including the bank), native shops and dwelling-houses in the vicinity of the Basel Mission factory have now been fumigated. Any necessary sanitary alterations or repairs are "in hand."

The sanitary authorities hope to open this area for trade very shortly.

G. C. W.

APPENDIX G.

LETTER FROM DR. J. GUITERAS TO DR. HORN.

Hospital "Las Animas," Habana,
September 7th, 1911.

DEAR DOCTOR,

In answer to your letter of August 25th, relating to the diminution of yellow and bilious remittent fevers in Habana as a result of measures against the Stegomyia mosquito, I take pleasure in forwarding the following table of deaths from yellow fever in Habana :—

YEAR.	NUMBER OF DEATHS.	REMARKS.
1857	1,308	During the 'fifties there was an active movement in favour of annexation to the United States.
1858	2,058	
1859	1,396	
1860	1,093	
1861	433	Occupation of the Island of St. Domingo by Spain.
1862	1,020	
1863	1,386	
1864	550	Withdrawal from St. Domingo.
1865	560	
1866	51	
1867	591	
1868	290	Beginning of 10 year's war for Independence.
1869	1,000	
1870	572	
1871	991	
1872	515	
1873	1,244	
1874	1,425	
1875	1,000	
1876	1,619	
1877	1,374	
1878	1,559	Ending of the war.
1879	1,444	
1880	645	
1881	485	
1882	729	
1883	849	
1884	511	
1885	165	
1886	167	
1887	532	
1888	468	
1889	303	
1890	308	Peace.
1891	356	,,
1892	357	,,
1893	496	,,
1894	382	,,
1895	553	Civil War.
1896	1,282	,,
1897	858	,,
1898	136	
1899	103	American Intervention.
1900	322	,, ,,
1901	25	Beginning of Stegomyia campaign
1902	—	American Intervention. Cuban Republic. Stegomyia campaign.
1903	—	Cuban Republic. Stegomyia campaign.
1904	—	,, ,, ,, ,,
1905	22	Yellow Fever introduced from New Orleans. Cuban Republic. Stegomyia campaign.
1906	12	Cuban Republic and American Intervention after August. Stegomyia campaign.
1907	5	American Intervention. Stegomyia campaign.
1908	1	,, ,, ,, ,,
1909	—	Cuban Republic. Stegomyia campaign.
1910	—	,, ,, ,, ,,
1911 to date	—	,, ,, ,, ,,

It is well to remember that since 1901 the number of non-immunes has been steadily increasing, and immigration has been very active. The population has increased from 258,000 to 320,000.

TABLE OF DEATHS FROM MALARIA IN HABANA.

YEAR.	NUMBER OF DEATHS.	REMARKS.
1871	262	Civil war.
1872	316	,,
1873	329	,,
1874	288	,,
1875	284	,,
1876	334	,,
1877	422	,,
1878	453	Ending of the war.
1879	343	Peace.
1880	384	,,
1881	251	,,
1882	223	,,
1883	183	,,
1884	196	,,
1885	101	,,
1886	135	,,
1887	269	,,
1888	208	,,
1889	228	,,
1890	256	,,
1891	292	,,
1892	286	,,
1893	246	,,
1894	201	,,
1895	206	Beginning of civil war.
1896	450	War.
1897	811	,,
1898	1,907	,,
1899	909	American Intervention.
1900	325	,, ,,
1901	151	American Intervention. Mosquito campaign.
1902	77	Cuban Republic. Mosquito campaign.
1903	51	,, ,, ,, ,,
1904	44	,, ,, ,, ,,
1905	32	,, ,, ,, ,,
1906	26	American Intervention. Mosquito campaign.
1907	23	,, ,, ,, ,,
1908	19	,, ,, ,, ,,
1909	6	Cuban Republic. Mosquito campaign.
1910	18	,, ,, ,, ,,

The increase in 1910 is due to imported cases from the interior, where there has been some little increase on account of migrations of people drawn by great industrial developments, new railroads, sugar plantations, mining camps. These attract sickly (malaria) men who can't make a good living where they are known as such, and they infect the camps. This factor in the epidemiology of malaria is not sufficiently recognised. I am trying to have the blood examined before men are engaged for work.

Now as to bilious remittent fever. I find that this diagnosis is practically effaced from our lists since the yellow fever disappeared. We hear of it, though very rarely, in sections of the country where there is black-water fever.

I have had the opportunity to study malaria in the South Atlantic States and along the Mississippi. There also the bilious remittent, such as the English describe in India as comparatively rare. In 1886 I remember hearing an old physician from Beaufort, S.C., remark with a twinkle in his eye: "The last case of bilious remittent fever I ever saw was some years ago, and I saw my last case of yellow fever about the same time."

I imagine that you in India take easily to this diagnosis, whilst we in America are somewhat skittish of it, for someone might suspect that we are having a little epidemic of yellow fever.

But, as a matter of fact, the bilious remittent of Geo. B. Wood, and earlier American writers, and of your physicians in India, I have not seen in Cuba. Do you write as much about it in India as you used to?

I do not mean to suggest that you may have had yellow fever in India; that would be absurd; but is it not possible that the wish to maintain clearly the distinction may have given rise to an abuse of the term bilious remittent, specially by men who had been trained in yellow fever countries? I am aware that I am speaking of conditions that I am not familiar with, and beg your pardon for the suggestions.

J. G.

APPENDIX H.

YELLOW FEVER IN TOGOLAND.

The first record of yellow fever in Togoland was made in 1905 at the station of Anecho. This town was formerly the seat of the Government, some of the offices being situated in the town of Anecho itself, and the remainder in Sebe, which is situated on the opposite side of the lagoon at a distance of about two kilometres. In 1895 the Government was moved to Lome, the cause being a very high rate of mortality amongst the European population. This was at the time attributed to severe malaria, but there is a strong probability that the disease was yellow fever.

Up to 1905 there had been no European deaths in Anecho for a period of two and a half years. A change came about towards the end of January, and from January 27th to February 2nd three Europeans died. Two of these were members of the Catholic Mission. The first, a Catholic Brother, died, as later enquiries showed, with apoplectiform symptoms and high fever, after scarcely one day's illness. The second, a Catholic Sister, died on February 2nd, and was found to have exhibited jaundice and black vomit. Neither of them was medically attended. Light was thrown upon these cases by the death, on January 31st, of a young merchant, who had resided in the Colony for a period of four years. He died on the third day of his illness, which at first suggested an attack of renal colic. He showed some improvement soon after the onset of his illness, but on the third day a remarkable slowing of the pulse, with high temperature, jaundice, and black vomit, revealed its true nature. He was buried on February 1st.

On February 10th, a Father of the Catholic Mission was attacked and exhibited similar serious symptoms. He embarked on a homeward bound steamer, but was obliged to land at Lome, where he died on February 14th.

A few days later another local merchant was attacked by the disease. He recovered.

On March 23rd a young merchant, who came from Grandpopo in Dahomey, was brought into hospital unconscious, and died on the same day at midnight. He had been in the tropics four months. The cause of death was yellow fever.

On April 10th, the Mother Superior of the Convent at Agoué in Dahomey, who was visiting Anecho, was attacked by yellow fever, which she had contracted in Agoué, and died after a few days. She had been in the tropics for twenty years. A Sister from the same Convent, who came to Anecho to nurse the Mother Superior, also died of the disease. Her illness lasted eight days, and jaundice became very pronounced, the skin turning almost a brown colour.

In April also a convalescent from yellow fever, who came from Grandpopo, was put under treatment in the quarantine station at Hilakofi.

Before the outbreak of yellow fever in Anecho, cases of yellow fever had occurred in Dahomey. In connection with this it is interesting to note that at the beginning of the year, Togo and Dahomey were visited by the French steamship "Tibet" which had come from the French ports in North Africa. Two members of the ship's company, one of them the surgeon, died on the voyage with symptoms of yellow fever, and the entire crew was placed in quarantine in Dahomey for five days.

In April cases of yellow fever were still occurring in Agoué and Grandpopo. In the latter place all Europeans were finally removed to a neighbouring village, where they were kept for some time. After their return, no further cases occurred.

At the Convent at Agoué the two remaining sisters (two had died in Anecho) also died of yellow fever. No cases were observed amongst the natives in Anecho.

In the cases which were observed in Anecho the disease was characterised by sudden onset, high fever, and prostration. The patients were restless, could not sleep, and seemed bereft of hope. Face flushed, eyes moist and shining, vomiting from time to time. Loss of appetite, but great thirst. Severe neuralgic pains in forehead and loins, in some cases a marked tenderness to pressure from the epigastrium downwards. In two of the patients a peculiar smell, like that of freshly altered blood, was noticed. This stage lasted about two or three days, and during it no organic changes could be made out. As a rule a remission occurred, at any rate a fall of temperature and a lessening of prostration were noticed. This critical pause was very marked in one patient, who, on the third day of his illness, was quite free from fever, and felt so well that he could not be kept in bed, and energetically demanded a draught of beer and a cigar. He died three days later. Jaundice appeared about the

fourth day, and became more pronounced as the case progressed. The yellow colour persisted for weeks in a convalescent. Faget's sign usually appeared about the third day. The urine was in most cases albuminous, in some also containing bile pigment. In prolonged cases hæmorrhages occurred from stomach, bowel, nose, or under the skin. In such cases the vomit was black, and punctate hæmorrhages were noticed in the skin. In one case such hæmorrhages were seen under the conjunctivæ. Consciousness in some cases was retained almost to the end; two cases were markedly euphorbic, in the others stupor or delirium set in.

Such, given shortly, is the account of his cases by Dr. Külz.* He mentions that possibly other, but slight, cases occurred, as in the Catholic Mission at Anecho, three members of which died; several of the other members were attacked by an illness at all events suggesting yellow fever.

The protective measures taken in Anecho during this epidemic consisted in the usual arrangements for protecting the patients from the bites of mosquitoes, and for destroying the latter.

In Anecho an anti-mosquito campaign was started by house-to-house inspection, the treatment of pools after rains by filling them in or covering them with saprol, and the damming of the lagoon.

On February 15th, a quarantine station for Europeans and natives was established at Porto Seguro, between Anecho and Lome, for a period of four weeks, and again on April 21st for three weeks. On the latter date also land- and sea-quarantine came into force against Dahomey, a quarantine station being established at Hilakofi, about two miles from Sebe. At Porto Seguro and Hilakofi mosquito-proof sheds were put up for the use of Europeans, while a force of police watched the communications.

Later on in 1905 Dr. Sunder observed two fatal cases of yellow fever in the district of Lome-Land. The patients were natives and employed on the inland railway.

Yellow fever made its next appearance in 1906 at Badja, which lies on the Lome-Palime railway about 43 km. to the north of Lome. Here six Europeans, who were employed in boring operations, had put up temporary dwellings 3 km. from Badja and 400 m. from the actual boring. The sheds were raised about one metre from the ground. The native workmen and servants lived in huts about 50 metres away, but as their habitations were leaky, they were in the habit of sleeping under the European dwellings. There is no record of yellow fever amongst them, but Krüger, after considering all possible factors, concluded that the "yellow fever germs could have been brought to the boring station only by natives." Of the six Europeans, four died of yellow fever in little more than a week.

†(1) A. D., aged 38 years, arrived in Togo on 28th January, 1906. Apart from an injury to the right knee he had remained quite healthy. On the afternoon of April 19th he suddenly became ill with a rigor, intense headache, most marked in the region of the glabella, and dull pains in the epigastrium. He proceeded to Lome, and was admitted to hospital on April 21st.

On admission a peculiar fœtor was noticed about the patient, which persisted after bathing, &c. Face red and suffused, eyes moist and injected, tongue swollen and indented, coated more in the middle than at the edges, point red. Pulse 104, regular and full; temperature 104°. Margins of spleen and liver not palpable, abdominal pain on pressure. Urine albuminous.

April 22nd. Vomiting, slight jaundice of conjunctivæ. Vomit contained some black slimy threads and flakes.

April 23rd. Patient very miserable after a restless night. Headache less, slight stupor. Urine clear, yellow, albuminous. Skin a dirty greyish-yellow colour. Singultus. Vomit shows an increase of black shreds and flakes. About midday frequent and profuse vomiting of black watery masses showing a red margin in the glass vessel. Pulse very soft, singultus, stupor more marked. Shortly before death tonic contractions of flexors of arms and hands, and of facial muscles. Passed no urine after 6 a.m.

Post-mortem findings: Jaundice, fatty degeneration of the kidneys, liver and heart-muscle (cloudy swelling). The stomach contained about 509 c.c. of thin blackish liquid with some soft friable shreds. Hæmorrhages under the epicardium and pleura, in gastric mucosa and right renal pelvis, and one small hæmorrhage in the left lobe of the liver.

(2) R. H., 28 years old, arrived in Togo on 28th January, 1906, and came to Lome with A. D. on April 21st. He had a rigor during the night, but felt well the next day. Towards evening feverish and vomiting. On April 23rd he complained of headache and lassitude. Face flushed, eyes moist, tongue coated in the middle, edges red. Temperature 100·5°; pulse 80, full and regular. Urine free from albumen. On April 24th pain in epigastrium, increased by pressure. Peculiar fœtor of breath. Tongue slightly swollen, conjunctivæ injected. Had a very restless night. On

* Annual Report, 1905–6, "Blätter und Briefe," by Külz.

† Published in Archiv für Schiffs und Tropen-Hygiene X, 21.

April 25th showed slight stupor and looked very ill, though feeling better. Slight jaundice of conjunctivæ, strong oral fœtor. No blood in vomit. Urine albuminous and diminished in quantity. On April 26th the whole body had assumed a dirty yellow pale colour. Blackish fæces. No urine since last evening. During the afternoon sighing respiration, singultus and stupor. Died at 8.45 p.m.

Post-mortem findings: Generalised jaundice, ecchymoses of epicardium, pleuræ, renal pelves, stomach and gut. Stomach contained about one litre of black coffee-ground material, the jejunum a tough tarry substance. Punctate hæmorrhages on under surface of liver. Fatty degeneration of liver, kidneys and cardiac muscle.

(3) W. M., 24 years of age, arrived in Togo on 28th January, 1906, and remained in good health until midday of April 23rd, when he became suddenly ill with headache, rigor, pain in epigastrium, and vomiting. He was admitted to hospital in the evening of April 24th. Face flushed and suffused, conjunctivæ injected, tongue coated, especially in the middle. Strong oral fœtor. Temperature 104·7° ; pulse 98, full and regular. Tenderness on pressure over epigastrium. No enlargement of spleen or liver.

April 25th. General condition unchanged. Eyes generally closed, open only with an effort. Great thirst. Sweating. Urine clear yellow and albuminous. No vomiting.

April 26th. Patient worse. During the afternoon epigastric pains and vomiting. Sighing respiration. Slight jaundice of conjunctivæ. Urine lessened in quantity, albuminous. Mouth dry.

April 27th. Greyish-yellow skin, strong oral fœtor. Tongue coated in centre, edges red. Small quantity of albuminous urine. Stupor.

April 28th. Patient had a restless night, but declares he feels well. Pain in whole body, especially on pressure in epigastrium and region of bladder. Muscles of lower extremities very sensitive. No urine. Sighing respiration and singultus. During the afternoon vomit with small black shreds and flakes. Blue discolouration of both elbows. Cramps shortly before death at 4.55 p.m.

Post-mortem findings: Generalised jaundice, ecchymoses of epicardium, pleuræ, pelvis of left kidney and bladder. Stomach and intestines contained greyish-black turbid fluid. Fatty degeneration of liver and kidneys.

(4) E. B., aged 23 years, arrived in Togo on 28th January, 1906, and remained well. On April 24th he proceeded to Lome and was isolated. He felt quite well. Temperature normal.

During the afternoon of April 26th he complained of a feeling of pressure in the frontal region, which he attributed to the great heat in the ward. He had no other complaint to make. Face flushed and slightly swollen, eyes moist, tongue slightly coated. Temperature a little over 100°, pulse 94, full and regular. No abnormalities of lungs or heart. No abdominal tenderness. The edges of liver and spleen not palpable. Urine light yellow colour, free from albumen and sugar. No malarial or other parasites were found in the blood. Towards evening distinct, but slight, injection of conjunctivæ. Diagnosis: yellow fever.

April 27th. General condition good. Symptoms more pronounced. Characteristic oral fœtor like that of freshly altered blood. Tongue coated, less at tip and edges than in the middle. Great thirst. Urine plentiful, clear, yellow. Marked and almost continuous sweating. Pultaceous stool, no vomiting. 230 c.c. blood drawn by venesection.

April 28th. General condition good. Urine 1,800 c.c., clear, yellow, no albumen. Stools pultaceous. Patient takes plenty of fluid. Strong sweating, increased by packing. At 12 a.m. a dose of Karlsbad salts, which is soon vomited and followed by an inclination to vomit. This disappears on giving *Emuls. Chloroformi.* No parasites in blood preparations.

April 29th. General condition unchanged. Nausea more marked, treated with chloroform emulsion. Patient takes plenty of liquid. Urine yellow, 1,500 c.c., free from albumen and bile. Twice liquid brown stools. No parasites in blood. During the afternoon 200 c.c. blood drawn by venesection.

April 30th. General condition unchanged. No tenderness to pressure over abdomen, no enlargement of spleen and liver. Urine yellow, 1,400 c.c., contains albumen for the first time (0·25 per cent.), no bile pigment.

Hot pack followed by strong sweating. In the afternoon very slight jaundice of scleræ.

May 1st. Temperature down to normal. Patient feels well, has some appetite, and speaks of soon again taking up work. Marked icterus with a bluish tinge, conjunctival injection, more pronounced. Urine port wine coloured, contains albumen (1 per cent.) and bile pigment, 1,400 c.c. Bowels moved three times, pultaceous greyish-brown stools. During the afternoon hot pack, and again inclination to vomit. Very slight stupor.

May 2nd. Rise of temperature. Patient worse. Strong oral fœtor, tongue thickly coated in middle. Distinct stupor. Jaundice more pronounced, almost a dirty yellow-brown

colour. No abdominal tenderness on pressure. Urine diminished in quantity, 800 c.c., port wine coloured, contain 0·75 per cent. albumen and bile.

During the afternoon vomiting. Vomit contains several brown slimy flakes. No parasites in blood.

May 3rd. General condition much worse. Stupor. Jaundice has deepened in colour. Pulse small but regular. During the morning profuse sweating after packing. Urine about 500 c.c. in eight hours, partly voided into bed, contains albumen and bile pigment. Dark brown stool, voided into bed.

Sighing respiration, interrupted by frequent singultus. Shortly before death tonic cramps of flexors of arms and hands. From 8 a.m. rapid rise of temperature until death, at 2.44 p.m. 105·4°, immediately after death 108·5°.

Post-mortem findings: Jaundice. The mucosa of the stomach is coated with tenaceous brownish-red slime, and over the fundus shows numerous streaky and partly confluent hæmorrhages. Small and large intestines show punctate and streaky hæmorrhages. The punctate hæmorrhages are most profuse in the region of the ileo-cæcal valve and in the large intestine. Bladder contains about 50 c.c. of beer-brown turbid urine, several punctate hæmorrhages in its mucosa. Isolated punctate hæmorrhages under the right pleura. No malarial parasites in brain or spleen. Ecchymoses under the pericardium, in renal pelves, and under the serosa of the liver. Fatty degeneration of the kidneys, liver and of cardiac muscle. Foci of broncho-pneumonia in lower lobe of right lung.

Krüger summarises the cases as follows :—

(1) High mortality (100 per cent.).

(2) Sudden onset.

(3) Similarity in the course of the fever.

1st stage. High temperature for four to five days.

2nd stage. Remission on 5th or 6th day; either death at this stage (two cases), or

3rd stage. Secondary rise of temperature and death on the 5th and 8th days (two cases).

(4) Low frequency of the pulse, even with high temperature. In three cases a rise in frequency shortly before death.

(5) Albumen in the urine (not exceeding 1·25 per cent.) appeared—

From the 3rd day of illness in two cases.
„ 4th „ „ one case.
„ 5th „ „ „

Diminished excretion of urine—

On the 4th day of illness in three cases.
„ 7th „ „ one case.

Suppression of urine on the day of death in three cases.

(6) Numerous fresh and stained blood preparations taken at various hours were found free from parasites.

(7) No enlargement of spleen and liver.

(8) Characteristic oral fœtor resembling the smell of freshly altered blood.

(9) Face suffused, conjunctivæ injected, tongue clean, or almost so, at edges and tip.

(10) Frequent vomiting.

Bloody vomit marked in two cases on the 4th and 5th day of illness, slight in one case on the 6th day, and merely an indication of it in one case on the 8th day.

(11) Dirty coloured jaundice appearing—

On the 4th day in three cases.
„ 5th „ one case.

(12) Feeling of well-being during the remissions.

(13) Towards the end stupor, with singultus and sighing respiration; and last of all cramp-like phenomena.

Post-mortem findings :—

(1) Jaundice.

(2) Bleeding—

(*a*) into the mucosa of the stomach (four cases), the gut (three cases), the bladder (two cases), the renal pelvis (four cases);

(*b*) into the serous membranes (pleura, epi- and endocardium (four cases);

(*c*) into the liver (four cases).

(3) Fatty degeneration of the liver (without enlargement of the organ), the kidneys, and the heart muscle.

(4) Spleen slightly enlarged and soft in one case, not enlarged in three cases.

(5) No malarial or other blood parasites in smears from spleen and brain.

(6) No intestinal ulceration.

(7) Congestion of intestines.

Soon afterwards another case of yellow fever occurred and ended in recovery. Infection had takan place in Badja. In the beginning of August, a sixth case occurred and ended fatally. Infection occurred at Tovega, to the north of Badja.

In March, 1907, Dr. M. died of yellow fever at Palime. He had been infected in Anecho, and died shortly after being transferred to Palime. After this case quarantine against Anecho was again established at Porto Seguro.

In spite of the introduction of yellow fever cases into Lome, no further cases occurred there, owing to active anti-mosquito measures, isolation of the patients and suspects in mosquito-proof wards, and fumigation of the wards with sulphur.

In April, 1907, an enactment of the Governor provided for the storage of the following materials by the Public Works Department in Lome :—

500 kg. sulphur.
1,500 square metres of mosquito-netting with meshes not exceeding 1 mm.
200 square metres wire-gauze with meshes not exceeding 1 mm.
100 kg. dextrin.
2,000 square metres strong packing paper.
2,000 square metres thin packing paper, breadth of about 50 cm.

Medical Officers to requisition from this store, which is to be replenished immediately. The head of the Public Works Department to be responsible for the carrying out of these instructions, and to notify the Government annually whether the full quantities are contained in store.

Yellow fever made its next appearance in Anecho, where Dr. Günther records four cases in natives, one of which ended fatally and was confirmed by post-mortem examination. The three other cases showed pronounced symptoms. (Annual Report, 1907–1908.)

In January, 1910, another case was reported by Günther in Anecho. A native prisoner in Sebe suffered from fever and abdominal pain three days before he came under observation. He stated that after the first symptoms he felt quite well for one day, but that his illness had set in again. With a temperature of 101° his pulse counted only 45 (two days later 42). He looked very ill. Abdomen retracted. Tenderness to pressure over the stomach. Yellow scleræ. Generalised pains. Urine albuminous, the quantity of albumen rising from 5 per cent. to 11 per cent. On the day after admission hæmorrhages were noticed from the edges of the tongue. He made a slow recovery.

The patient was kept under a mosquito net. The prison at Sebe was fumigated with sulphur. All prisoners were under observation for ten days, and special anti-mosquito measures were taken.

No further cases occurred, and quarantine was not considered necessary.

In August, 1910, the occurrence of an epidemic was reported in Anima, in the trans-Kara region, about 60 km. to the north of Sokode. During the five days from July 26th to July 30th, twenty-five deaths and thirty other cases of illness were said to have occurred. This account, from native sources, was probably exaggerated. Dr. Zupitza proceeded from Sokode, and arrived in Anima on August 13th. He gives details of one fatal case of yellow fever, and of two slight cases which recovered, and concluded that the epidemic had probably been one of yellow fever.

The fatal case, a middle-aged woman, showed sudden onset with rigor, fever, headache and generalised pains, moist and injected eyes. On the fourth day pain or pressure over epigastrium and liver very marked. Faget's sign absent. No vomiting. She died on the eighth day.

After death the scleræ, gums, and mucosa of lips were a light lemon colour. No post-mortem examination, for politic reasons.

In one of the slight cases headache and generalised pains, especially in the legs, marked tenderness over the epigastrium radiating to the pubis. No parasites were found in the blood. Prostration out of all proportion to the symptoms.

In June, 1911, a prisoner in Misahöehe was attacked and died. The post-mortem findings were typical of yellow fever: Jaundice, hæmorrhages, and fatty liver. In addition, pulmonary tuberculosis.

Besides these cases of yellow fever, two suspicious fatal cases in natives occurred at Sansane-Mangu in September, 1910, and one at Sokode in September, 1911, in a European, who died after a very short illness. As these cases have not been confirmed, they are not

included in the following table, which sets forth the details of the twenty-seven cases already referred to :—

YELLOW FEVER IN TOGO.

Year.	Date.	Sex.		Race.		Died.		Recovered.		Place.	Infected in.	Recorded by.
		M.	F.	E.	N.	M.	F.	M.	F.			
1905	January 27	1	—	1	—	1	—	—	—	Anecho ..	Anecho ...	Dr. Külz.
	,, 31	1	—	1	—	1	—	—	—	,, ...	,, ...	,,
	February 2	—	1	1	—	—	1	—	—	,, ...	,, ...	,,
	,, 10	1	—	1	—	1	—	—	—	Lome ...	,, ...	Külz and Krüger
	,, ?	1	—	1	—	—	—	1	—	Anecho ...	,, ...	Dr. Külz.
	March 23	1	—	1	—	1	—	—	—	,, ..	Grandpopo ...	,,
	April 10	—	1	1	—	—	1	—	—	,, ...	Agoué ...	,,
	,, 19	—	1	1	—	—	1	—	—	,, ...	,, ...	,,
	,, ?	1	—	1	—	—	—	1	—	,, ...	Grandpopo ...	,,
	,, ?	1	—	—	1	1	—	—	—	Lome-Land...	Lome-Land...	Dr. Sunder.
	,, ?	1	—	—	1	1	—	—	—	,, ...	,, ...	,,
1906	April 23	1	—	1	—	1	—	—	—	Lome ...	Badja ...	Dr. Krüger.
	,, 26	1	—	1	—	1	—	—	—	,, ...	,, ...	,,
	,, 28	1	—	1	—	1	—	—	—	,, ...	,, ...	,,
	May 3	1	—	1	—	1	—	—	—	,, ...	,, ...	,,
	,, ?	1	—	—	1	—	—	1	—	,, ...	,, ...	,,
	August ...	1	—	—	1	1	—	—	—	,, ...	Tovega . .	,,
1907	March ...	1	—	1	—	1	—	—	—	Palime ...	Anecho ...	,,
	? ...	1	—	—	1	1	—	—	—	Anecho ...	,, ...	Dr. Günther.
	? ...	1	—	—	1	—	—	1	—	,, ...	,, ...	,,
	? ...	1	—	—	1	—	—	1	—	,, ...	,, ...	,,
	? ...	1	—	—	1	—	—	1	—	,, ...	,, ...	,,
1910	January ...	1	—	—	1	—	—	1	—	,, ...	Sebe ...	,,
	August ...	—	1	—	1	—	1	—	—	Anima ...	Anima ...	Dr. Zubitza.
	,, ...	—	1	—	1	—	—	—	1	,, ...	,, ...	,,
	,, ...	1	—	—	1	—	—	1	—	,, ...	,, ...	,,
1911	June ...	1	—	—	1	1	—	—	—	Misahöhe ...	Misahöhe ...	Dr. Sunder.
		22	5	14	13	14	4	8	1			

The table shows a striking rate of mortality (66·6 per cent.) especially among the Europeans (85 per cent.); a marked diffusion of cases over the Colony, from the coast-line to beyond the ninth degree of latitude in the north. No direct connection can be traced between the various outbreaks, and the only conclusion possible is the endemicity of the disease in the native population. Külz (1905) was unable to discover cases among the natives, but it is significant that as time went on cases in natives have been reported, two in 1906, four in 1907, four in 1910, and one in 1911.

That yellow fever occurs among natives, often in a slight and almost unrecognisable form, is the opinion generally held by the medical authorities in Togo. With regard to this, it is interesting to find Krüger (Annual Report, 1905–1906) referring to the "massed appearance of icterus, with or without fever, which is very common amongst the natives, and frequently suggests infection through contact by the successive occurrence of it in people who share the same house."

Sunder in an article entitled "Yellow Fever among Negroes" (Gazette, 8th January, 1907), concludes: "It is to be hoped that the assertion that negroes are immune to yellow fever, which has for a long time been in contradiction with the known facts, may be regarded as finally disposed of. The black race is as little immune to yellow fever as it is to malaria."

The Regulations for Sanitary Inspectors, paragraph 11 (Gazette, 20th September, 1907), instruct them to report to the Medical Officer " . . . . . especially regarding the appearance of diseases such as small-pox, leprosy, yellow fever (also jaundice)."

G. E. H. L.

MAP I.

FREETOWN

SHEWING WHERE CASES OF YELLOW FEVER OCCURRED IN 1910.



0 500 1000 FEET

0 1 2 3 4 FURLONGS

Qtr where Europeans live

Qtr „ Syrians „

Y.F. cases numbered red to correspond with numbers in text.

For reduplication of the number 7 see page 7 of the Report.

WATERLOW & SONS LIMITED. LONDON WALL. LONDON.

SKETCH PLAN

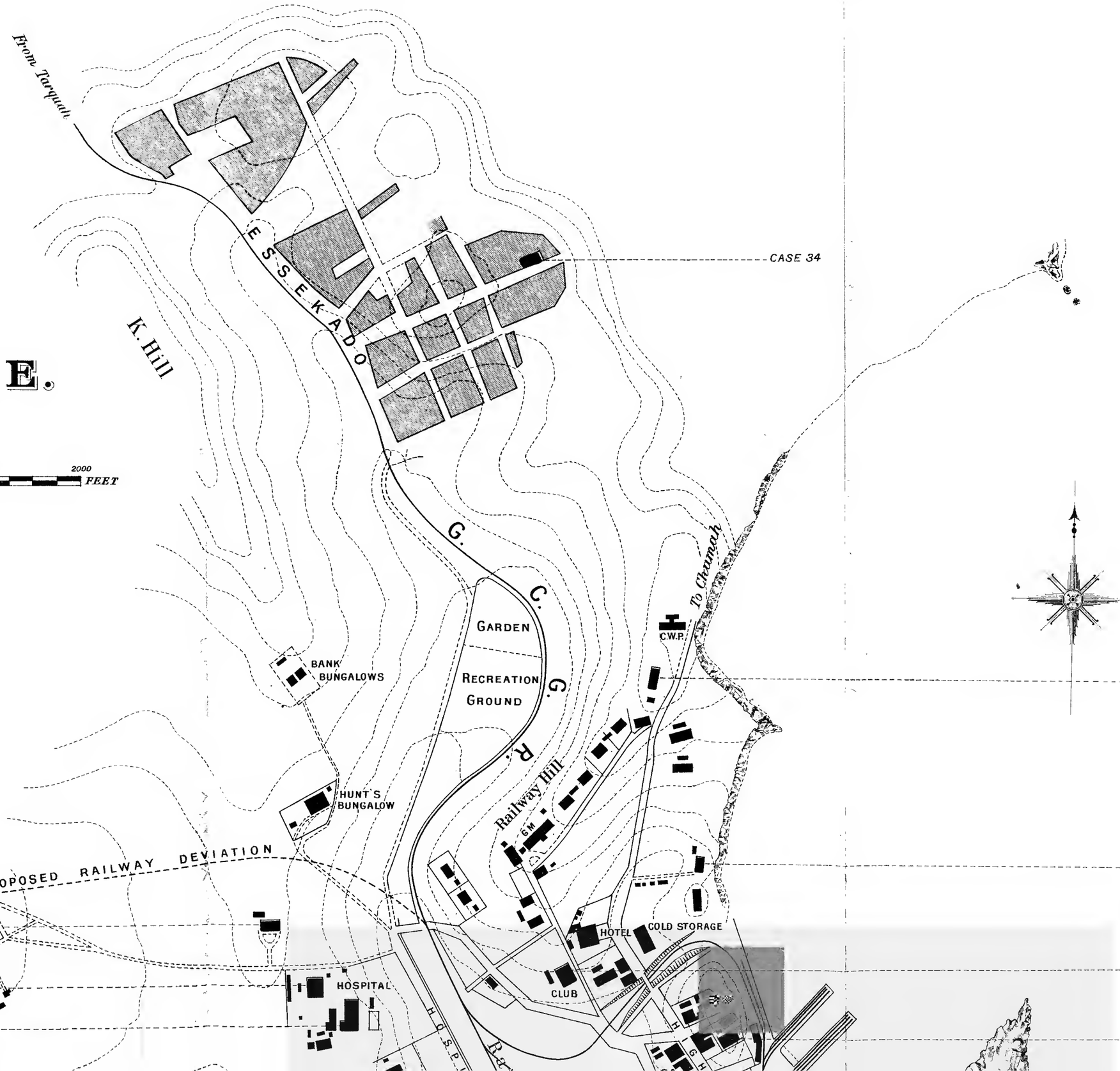
OF

SECCONDEE.

Scale:- 1:5000

0 100 200 300 400 500 1000 1500 2000
FEET FEET

Shewing the Houses where
Yellow Fever occurred in 1910.



ETCH PLAN

OF

CONDEE.

Scale:- 1:5000

1000 1500 2000 FEET

g the Houses where
Fever occurred in 1910.

From Tarquah

ESSEKADO

K. Hill

G. C. G. R.

GARDEN

RECREATION GROUND

BANK BUNGALOWS

HUNT'S BUNGALOW

PROPOSED RAILWAY DEVIATION

CENTRAL PRISON

HOSPITAL

H.Q.S.P.I.

Railway Hill

G.M.

HOTEL

COLD STORAGE

CLUB

P.O.

C.W.P.

To Chamah

CASE 34

CASE 33 LIVED HERE

CASE 25.

CASE 31 LIVED HERE

CASE 23. 24. 25.
CASE 31 PROBABLY INFECTED HERE

CASE 32. LIVED HERE

NATIVE HOSPITAL

EUROPEAN HOSPITAL

PROPOSED RAILWAY DEVIATION

CENTRAL PRISON

BANK BUNGALOWS

HUNT'S BUNGALOW

HOSPITAL

GARDEN

RECREATION GROUND

C.W.P.

G.M.R.

Railway Hill

GM

HOTEL

COLD STORAGE

CLUB

H

G

H

P.O.

HOSPITAL ROAD

BARRACK QUARTERS

Chapel

Railway Enclosure

MILLER

BANK

STREET

MARKET

ROAD

PRISON

FORT

D.C.COURT

POASSI

HARBOUR WORKS

HIGH COURT

KROO BOYS QRS

DESTRUCTOR

Harbour Works

Proposed Site for New Housa Zongo

Reclaimed Land

MAIN DRAIN

FISH OVENS

BOUNDARY

LAGOONSIDE

No. 1. Lagoon

ACCRATOWN

R.C. Cathedral

ROAD

CASE 28

No. 2 Lagoon

Scavengers Village

Proposed Extension of New Town

Sweet Water Lagoon

HOUSA TOWN

NEW TOWN

POASSI

SLAUGHTER HOUSE

From Ekuasi

Waterlow & Sons Limited, London Wall, London



Waterlow & Sons Limited, London Wall, London

ACCRA

SHEWING WHERE CASES OF YELLOW FEVER OCCURRED IN 1911.

Scale 1/2120 or 3 Inches to 1 Mile.

YARDS 1000 500 0 500 1000 YARDS

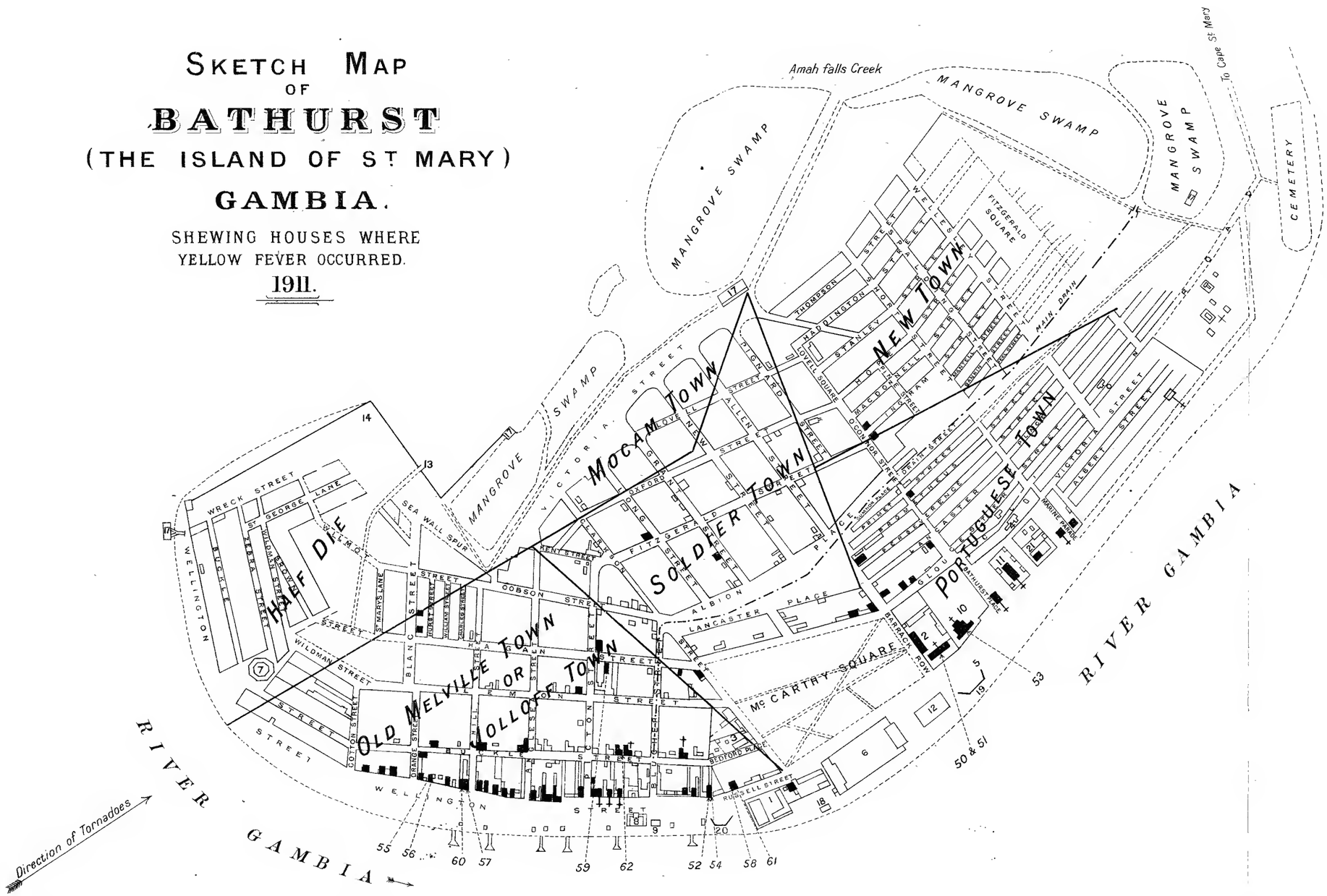
0 MILE ¼ ½ ¾ 1 MILE

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SKETCH MAP OF BATHURST (THE ISLAND OF ST MARY) GAMBIA.

SHEWING HOUSES WHERE YELLOW FEVER OCCURRED.

1911.



REFERENCES

1 Albert Market
2 Barracks
3 Bathurst Gaol
4 Bungalow
5 Colonial Flag Staff.
6 Colonial Church
7 Coal Depôt
8 Customs Warehouse.
9 Customs Boathouse.
10 Government House.
11 Military Hospital.
12 Merchant's Gunpowder Magazine.
13 Sluice Gate Half Die.
14 One Gun Battery.
15 Sluice Gate (Box Bar).
16 Public Offices and Court House.
17 Public Necessaries.
18 Slaughter House.
19 Six Gun Battery
20 Three Gun Battery.
21 Victoria Hospital.

Blue marks the houses occupied by Syrians.

Red marks the houses occupied by Europeans.

Government European officers quarters

New Bungalow

Colonial Engineer's Office
Bathurst, Gambia.

WATERLOW & SONS LIMITED, LONDON WALL, LONDON

MAP OF WEST AFRICA

Reference

Post & Telegraph ..... P.T.
Railways .....
in construction .....
Telegraphs .....
British .....
French .....
German .....
Portuguese .....
Liberia .....
Spanish .....

Scale 1/6,336,000 or 1 Inch to 100 Miles

MILES 100 50 0 100 200 300 MILES

Epidemics of yellow fever in 1910, shown thus ●
" " " " " 1911, " " ✦

20 15 10 5 0 Greenwich

WESTERN SAHARA
ATLANTIC OCEAN
SENEGAL
GAMBIA
PORT GUINEA
BULAM
Bissagos Islands
FRENCH GUINEA
SIERRA LEONE
FREETOWN
LIBERIA
MONROVIA
IVORY COAST
Grain Coast
Ivory Coast
Gold Coast
UPPER NIGER
NIGERIA
NORTHERN TERRITORIES
ASHANTI
TOGOLAND
DAHOMEY
ACCRA
COOMASSIE
BATHURST
DAKAR
ST LOUIS
KONAKRI
BAMAKO
TIMBUKTU
Gao-Gao (Gogo)
Sansanne Mango
Gambaga
Wa
Axim
Cape Coast Castle
Gr. Bassam
Sassandra
Grand Bassa
Buchanan
Edina
Robertsport
Sherbro I.
Greenville
C. Palmas
C. Three Points
Christiansborg
Elmina
Winnebah
Saltpond
Anomabu
Accra
Abetifi
Kumasi
Wiawoso
Sekondee
Axim
Tarquah
Nugua
Dabocrom
Insuaim
Akuse
Akropong
Dodowa
Prampram
Ada
Addah
Quitah
Lome
Porto Seguro
Agbome
Palime
Misahohe
Kpando
Anecho
Sokode
Atchemo
Yoto
Togo
Mayo
Imon
Gnimme
Ho
Kwa
Bekwai
Obuasi
Kpong
Akuse
Insuaim

MAP Nº 5.

5 0 Greenwich 5 10 15

H A R A

W. Agus
W. Akatu
W. Asakan
W. Tafasasset

Dibbela
Agadez
Agadem
Bedwaram

L. Fagibini
TIMBUKTU
Kabara
Ras el Ma
Tandam
L. Horo
Bassikunu
Sompi
Bar Tundufarma
Saraféré
S. Nere P.T.
Nampola P.T.
L. Deba
Gurao
Dalla
Hombori
Bamba P.T.
Rherro
Tosaye
Buram
Gao-Gao (Gogo)
Bornu
Bara
Ansongo
Bure I.
Karu R.
Dunsu
Tamaske
Taswa
Taghelel
Felingue
Buza
Kologo
Barwa
Bosso
LAKE CHAD
Bol
Mao
Ft Prade
Ft Millot
Bahr el Ghazal
Massakori
Kukuwa
Mogonu
Gulfei
Ft Lamy
Massenia
Kusseri
Dikoa
Maiduguri
Gujba
Gashaka
Ngaundere
Banyo
Tibati
Banyo
Bamenda
Bali
Bamum
Yoko
Kunde
Lambere
Yanga
Carnot
Bangelele
Babuta
Batum
Molet
Bonga
Lai
Lame
Binder
Lere
Garua
Yola
Guri
Lau
Amar
Bakundi
Konsha
Bakundi
Mbere
Dir
Mbere
Ndak
Dol
Mbe
Dir
Mbere
Banume
Kumbo
Karanga
Buguda
Zauro (Nu)
Sukadi
Alaji
Vanda
Ndumba
Gemane
Durmu
Jaunade
Akano Linga
Kam
Yukaduma
Lakgoti
Ngombako
Nyue
Sanga
Balbal
Molundu
Akonfem
Kom
Kribi
Ebolwoa
R. Kampe
Ibi
Wukari
Abinsu
Ankpa
Dekina
Okene
Okelli
Ishova
Ondo
Owo
Akure
Fuga
Idah
Katsena Allah
Oorugru
Ajaokuta
Lokoja
Gbebe
Mozum
Ikeram
Kabba
Amagede
Katonkarfi
Loko
Muva
Egbe
Budon
Patida
Eggan
Patagi
Lafiagi
Sao
Ajidingari
Igboho
Ilesha
Ilorin
Otta
Isoya
Ikerun
Ife
Ibadan
Iwo
Oshogbo
Ede
Ilesha
Ikeram
Abeokuta
Jebu Ode
Ota
Abomey
Agome Palime
Misahohe
Atchave
Kpando
Sokode
Ho
Akposso
Mayo
Abo
Togo
Anecho
Aneho
Porto Seguro
Grand Popo
Whydah
Jakotou
Badagri
Lekki
Lagos
Ogbo
New Benin
R. Benin
R. Escravos
R. Forcados
R. Ramos
R. Dodo
R. Middleton
Akassa
Brass
Fun Entrance
Bight of Biafra
Fernando Po (Span)
Calabar
Ikassa
Rio del Rey
Barombio
Joh. Albrecht's Hohe
Mondame
Tabasi
Mangamba
Victoria
Bimbia
R. Cameroons
Malimba
Marienburg
Batanga
Lolodorf
Bimbia
R. Lokunje
Bibundo
BUEA
Sepoi
Dupla
Edea
R. Nyong
Lomie
Ft Archinard
Say
Niadanga
Sirba R.
Dogondouchi
Zigolé
Bagidda
Birnin Konni
Saraina
Tibiri
Maradi
Tessawa
Tahoua
Gure
Zinder
Tanout
Gouré
Gearslek
Dabalia
Jamba
Baidawa
Jakorom
Bidamaram
Jakbeur
Lekarri
Komaduga Yobe
Bunu
Yamia
Burburua
Konni
Tahoua
Kalfou
Kalma
Beriberi
Dambarta
Zongo
Dandago
Garari
Barambagori
Jerrekassa
Machinna
Gumsi
Zamugu
Bamusu
Bitwa
Gau
Chikrikadwa
Geidam
Bahr el Ghazal
Massakori
Gorgoram
Katagum
Hadeija
R. Hadeija
Kano
Rogo
Banaga
Messau
Maiduguri
Dikoa
Kusseri
Massenia
Maniling
R. Shari
R. Bachi
Busso
Bongor
Lai
Musgum
Margi
Gombe
Nafada
Hashadu
Zaria
Kwiambana
Sakabar
Gwari
Koriga
Girku
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Leri
Rahama
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Tegina
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Kuka
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Bukuru
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Paiko
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Kacha
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Baro
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Lafia
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Domaga
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Banyo
Tibati
Banyo
Bamenda
Bali
Bamum
Yoko
Kunde
Lambere
Yanga
Carnot
Bangelele
Babuta
Batum
Molet
Bonga
Lai
Lame
Binder
Lere
Garua
Yola
Guri
Lau
Amar
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Konsha
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Mbere
Dir
Mbere
Ndak
Dol
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Dir
Mbere
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Kumbo
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Zauro (Nu)
Sukadi
Alaji
Vanda
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Gemane
Durmu
Jaunade
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Kam
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Lakgoti
Ngombako
Nyue
Sanga
Balbal
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Akonfem
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Kribi
Ebolwoa
R. Kampe
Ibi
Wukari
Abinsu
Ankpa
Dekina
Okene
Okelli
Ishova
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Owo
Akure
Fuga
Idah
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Oorugru
Ajaokuta
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Katonkarfi
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Sao
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Ilorin
Otta
Isoya
Ikerun
Ife
Ibadan
Iwo
Oshogbo
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Ilesha
Ikeram
Abeokuta
Jebu Ode
Ota
Abomey
Agome Palime
Misahohe
Atchave
Kpando
Sokode
Ho
Akposso
Mayo
Abo
Togo
Anecho
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Porto Seguro
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R. Cameroons
Malimba
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Bimbia
R. Lokunje
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Dupla
Edea
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Lomie
Ft Archinard
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Niadanga
Sirba R.
Dogondouchi
Zigolé
Bagidda
Birnin Konni
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Dupla
Edea
R. Nyong
Lomie

Sansanne Mango
Gambaga
Zebilla
Zouaragou
Binduri
Bawku
Jebiga
Pama
Yanga
Nagon Kori
Mali
Koshari
Kompa
Karimama
Madekali
Gaya
Bana
Gode R. Gundi
Yelwa
Birnin Kebbi
Gando
Argungu
Kaura
Zurumi
Katsina
Sokoto
Kwantadeji
Lema
Ajenna
Tombo
Julyju
Gidarri
Bikini
Kirtachi
Boti
Diapaga
Kupela
Fada N'Gurma
Matiakwale
Bilanga
Diafanga
Bussuma
Yako
Wagadugu
Tinguriku
Beri
Niago
Boromo
Wakara
Kworo
Tiola
Sikasso
Dielnugu
Leo
Bobo Dilasu
Tumu
Na
Buse
Lokoso
Gwa
Wa
Tengrela
Lera
Niambwambo
Dokta
Karaga
Buna
Bole
Kong
Tiemu
Kurusudugu
Yaboe
Nasian
Dabakala
Longoro
Kintampo
Bonduku
Sikosiko
Mango (Grumania)
Atabobo
Krachi
Kete
Salaga
Brumase
Yeji
Bismarckburg
Basari
Sokode
Bassila
Carnotville
Wesse
Shaki
Tabira
Ilesha
Igboho
Ajidingari
Lafiagi
Patagi
Patida
Eggan
Budon
Muva
Egbe
Katonkarfi
Loko
Amagede
Kabba
Ikeram

MAP OF WEST AFRICA

Reference

Post & Telegraph ..... P.T.
Railways ..... ——
in construction ..... - - - - -
Telegraphs .....

British	
French	
German	
Portuguese	
Liberia	
Spanish	

Scale 1/6,336,000 or 1 Inch to 100 Miles

MILES 100 50 0 100 200 300

All recorded Epidemics of yellow Fever to the end of 1911, shown thus ○
Hitherto known distribution of Stegomyia fasciata .....

G.S.,G.S., № 2434

MAP No. 6.

5 0 Greenwich 5 10 15

H A R A

W. Igus
W. Akatu
W. Asakan
W. Tafassasset

Dibbela
Agadez
Agadem
Bedwaram

TIMBUKTU
Kabara
Mandian
L. Fagibini
Ras el Ma
L. Haro
Bamba
Rherga
Bosaye
Buram I.
Gao-Gao (Gogo)
Bornu
Bara
Ansongo
Bure I.
Sompi
Saraféré
Tindufarma
Bassikunu
Nampala
L. Debo
Girao
Dalla
Bambi
Isaye
Wandiaure
Karu R.
Dansu
Tamaske
Taghelel
Tosa
Buza
Felingue
Sokolo
Diura
Bananduga
Mopti
Bandiagara
Monempe
Segala
Tango
Aribinda
Sinder
Garu
Tibo
Dori
Tau
Jenne
Niger R.
Bani R.
Segu-Sikoro
Wahiguya
White Volta R.
Ponsa
Zebba
Sirba R.
Sansan Aussa
Dogondoutchi
Baixu
Birnin Konni
Tessawa
Gure
Zinder
Kologo
Mao
Ft Prade
Ft Millot
Barwa
Bossoo
LAKE CHAD
Bol
Kukuwa
Geidam
Bahr el Ghazal
Massakori
Gulfei
Ft Lamy
Kussuri
Massenia
Manning
Dikoa
Maifoni
Gorgoram
Mogoma
Hadeija
Katagum
Kano
R. Hadeija
Rogo
Banaga
Messau
Gujba
Gashaka
Gombe
Nafada
Hashadu
Margi
Musgum
R. Yedseram
Bongor
Lai
Binder
Lere
Lame
Komergi
Gabaro
Biparo
Malabu
Garua
Yola
Guri
Lau
Amar
R. Benue
Rei Buba
Mandi
Bosoro
Manda
Sinabu
Vilebai
Mbongo
Dol
Mbe
Dir
Mber
Bokuna
R. Vina
Konsha
Ibi
R. Donga
Bakundi
Wukari
Katsena Allah
Banyo
Tibati
Ngaundere
Banaone
Mbere
Lom
Kimbo
Karanga
Buguda
Zaoro (Nu)
Kunde
Bamenda
Bali
Bamum
Yoko
Suka
Alaji
Yanga
Vanda
Genane
Ndumba
Durmu
Bundeh
Babba
Carnot
R. Mambere
R. Sanaga
Duala
Victoria
Bimbia
R. Cameroons
Mt. Cameroon
Fernando Po (Span.)
Akassa
Brass
Bonny
Bight of Biafra
Idea
R. Nyong
Jaunade
Akano Linga
Kam
Lomie
Ngombako
Ebolwoa
R. Kampo
Akoafem
Mohundu
Balbal
R. Jeh
R. Dja
R. Sanga
Kribi
Lagos
Porto Novo
Badagri
Abeokuta
Ibadan
Ilorin
Oshogbo
Ogbomosho
Iseyin
Oyo
Ede
Ilesha
Ife
Modakeke
Ondo
Owo
Ijebu Ode
Ikeja
Ishoya
Akure
Ikerun
Ikeram
Ikorodu
Epe
Ijebu
Ota
Abeokuta
Ado
Ajidingari
Sao
Kafanchan
Kabba
Lokoja
Ajawcha
Ankpa
Dekina
Abinsi
Gbebe
Moxum
Amageda
Idah
Fuga
Oorugu
Abakaliki
Ikom
Ossidinge
Cross R.
Okuni
Ogoja
Afikpo
Bendi
Owerri
Aro Chuku
Okiwi
Ogutu
Okigwi
Onitsha
Oka
Asaba
Awade
Sapele
Benin
Agbor
Ikoro
Gwato
New Benin
R. Benin
R. Escravos
R. Forcados
R. Ramos
R. Dodo
R. Middleton
Warri
Effurun
Ughelli
Ekpen
Idu
Okaiki
Aba
Calabar
Ikassa
Rio del Rey
Barombi
Mondoane
Tabasi
Mungamba
Bibundi
Soden
Sapoo
Rumby Hill
Fontemdorf
Mt. Albrecht's Hohe
Bight of Benin
Slave Coast
Gulf of Guinea
Ivory Coast
Gold Coast
Togo
Dahomey
Togoland
Ashanti
Northern Territories
Nigeria
Cameroons
Lokoja
Katsina
Zaria
Kontagora
Bussa
Nikki
Kaiama
Leba
Bajibo
Rabba
Jebba
Shonga
Mureji
Okuta
Fr Goldie
R. Moshi
Yashikera
Memari
Zungeru
Wushishi
Kuka
Kachia
Naraguta
Bukuru
Jemaan Darroro
Paiko
Bida
Abuja
Lapai
Keffi
Argai
Kacha
Baro
Nassarawa
Panda
Egga
Eggan
Lafiagi
Edgbe
Muva
Lafia
Beriberi
Katonkarfie
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Bulon
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